SKI-ING FOR BEGINNERS & MOUNTAINEERS

By W. R. RICKMERS

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SKI-ING

W. R. Rickmers.

THE WRITING ON THE MOUNTAINS.

Frontispiece.

SKI-ING

FOR BEGINNERS AND MOUNTAINEERS

BY

W. RICKMER RICKMERS

WITH PHOTOGRAPHS BY DR. A. HACKER, AND SILHOUETTES BY ELSA VON LEPKOWSKI

T. FISHER UNWIN
LONDON: ADELPHI TERRACE
LEIPSIC: INSELSTRASSE 20
1910

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PREFACE

THE foremost authorities on ski-running—Hoek, Paulcke, Richardson, and Zdarsky—may be said to own a common fund of knowledge which it would be invidious to attempt to distribute in detail. I am the pupil of one, have collaborated with two and exchanged ideas, held discussions and furrowed the snow with all of them. Nothing could be simpler or more just than to acknowledge them as contributors to the present volume. I have endeavoured to supplement their works in certain directions; I cannot improve upon them. To my teacher Zdarsky I owe much that cannot be adequately expressed in cold print. He introduced me to the delights of ski-ing, and with his ideas I have been so closely associated that my method must perforce be a plagiarism of his own in many respects. Special thanks are due to the publishers who allowed me to quote textually, and who have placed illustrations at my disposal: Eduard Lammers (Hoek, "Der Ski") and Horace Cox (Somerville, Rickmers and Richardson, "Ski-running").

The Ski Club of Great Britain and the Alpine Ski Club have kindly given permission to use passages from my own contributions to "Ski-running" and the Alpine Ski Club Annual. My friend Hoek has allowed me to quote freely.

I owe a great debt of gratitude to my old mountaineering companion Dr. Hacker, who with infinite patience devoted much valuable time, not to speak of a considerable portion of an Austrian magistrate's short holiday, to the production of the photographs. Over two hundred of these were taken on the glaciers of Tirol, and those reproduced on these pages are the result of careful selection. His is the greatest immediate share in the making of this book. To a young and unassuming lady he will not dispute a place of honour on the title-page. Fräulein Elsa von Lepkowski, of Kitzbühel, has drawn the clever silhouettes which are to relieve the artistic monotony of his excellent photographs.

For permission to use the justly famous results of their camera, I am indebted in the first place to Herr Herold, who supplied me with many views of Kitzbühel, the ski-runner's paradise, then to Dr. Hoek, and to many others whose names will be found under their pictures. Messrs. Longmans, Green & Co., the publishers of Dent's "Mountaineering," in the Badminton Library, have kindly given permission for the use of extensive quotations from

that classical work. It is the bible of the mountaineer.

Others whom I should not like to forget are Dr. Bauer, Dr. von Ficker, Dr. Benesch, Sektion Nürnberg, D.Oe.A.V., Herr Humpeler, Burgomaster Reisch, R. Schloss, F. Noelting, Dr. Inglis Clark, W. Fleischmann, O. Hengst, R. Gomperz, the Editor of "Winter," R. Biehler.

The help I have received on all sides is to me but another gratifying proof of the brotherhood of ski-mountaineers.

W. R. R.

Innsbruck in Tirol
December, 1909

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INTRODUCTORY

THE chief aim of this book is to establish a closer contact between ski-ing as an athletic sport and mountaineering which is a science. The rapidly increasing number of ski-runners are mostly recruited from a public which has but hazy notions of the dangers of the Alps. To tell them how they may diminish their risks and multiply their pleasures is the duty of every mountaineer. To accomplish this task much detail had to be sacrificed. On the other hand, I have devoted some space to general principles in order to encourage observation and a more thorough understanding. The beginner will find everything that is important in ski-running and mountaineering and nearly everything he need know during the first season or two. The mountaineer will see what ski-ing has to offer him, and how this new sport can be made subject to those laws which to him are as sacred as the hills.

Detailed information on outfit, snow, medical

aid, jumping, reconnoitring, hygiene, topography, meteorology, glaciers, Alpine dangers, &c., will be found in the following books :—

"Ski-running," by Somerville, Rickmers and Richardson (Horace Cox).

"Ski-ing," by E. C. Richardson.

"Mountaineering," by C. T. Dent (Badminton Library, published by Longmans, Green & Co. 10s. 6d.).

"Mountaineering," by Claude Wilson (Bell. 2s.).

At least one of each category must be read if, after having mastered the elements, the beginner wishes to obtain a more comprehensive insight into the vast subject and the many possibilities of ski-ing and mountaineering.

SKI-ING

SKI-RUNNING

The ski (generally pronounced *shee*) are long, narrow planks for gliding over the snow. As such they are one of the many devices invented by the hunters and peasants of northern countries. As a means for preventing the sinking in of the foot these are all nearly equally useful; it is to the great variety of movement possible on it that the ski owes its importance as an instrument of sport.

I shall not devote space to an enthusiastic praise of ski-running. Everybody knows that it stands high in popular favour, and the logical conclusion is that it must be very exhilarating and offer many possibilities for good sport. It ranks alongside of sailing, mountaineering, and all the forms of game-pursuit which combine the exercise of athletic skill with the thoughtful enjoyment of nature. With a little pluck, a little patience, and

a little intelligence the elements are easily acquired. Ladies are in no way handicapped, and nobody is too old to learn as long as he can stand or walk. On a beautiful, white winter's day the healthful fun starts right at the beginning. Those who devote some care to the rules of mountaineering have a wide field of enterprise before them and will live long enough to tell the tale of many adventures on Alpine heights.

H. Hoek.

WINTER IN THE MOUNTAINS.

Y. Herold.

BLACK AND WHITE: KITZBÜHEL.

See p. 23.

To face p. 20.

F. Herold.

To face p. 21.

GOOD SKI-COUNTRY.

SKI-COUNTRY

On the whole it may be said that the British Isles do not favour the beginner, unless he be living in the heart of the mountains. He will get more out of a short holiday and more for his money by spending both in Switzerland or Tirol than by going to some place in Scotland where snow conditions are uncertain and winter comforts doubtful. The cost in both cases would be about the same. Experts are in a different position, being able to make use of the fleeting hours while the snow lasts and finding new sensations amid new surroundings. Norway cannot, as yet, be recommended to the uninitiated, owing to the difficulty of language and that of finding congenial or suitable teachers. It is best for parties of friends who can ski well and are provided with introductions, or have made arrangements with the official travel-bureau at Kristiania.

The average individual intent upon a winter sports-holiday should at first seek one of the

well-known resorts of Central Europe. There he will find everything prepared for him: warm rooms, clubs, excursions, helpers, and guides. These are the great public schools where one gets the first training under an old-established system. Having gone through it one is fit to form one's own opinion where to go. Places which can always be depended upon for snow and sport are the Feldberg (Black Forest), in Germany; Lenzerheide, Villars, Davos in Switzerland; St. Anton and Kitzbühel in Tirol. Whoever wishes to spend a winter abroad for the sake of study, &c., can combine the practical advantage of town life with unlimited opportunities for ski-ing at the university towns of Freiburg and Innsbruck. In most of these places the main season is reckoned from Christmas till the 1st of March. But March is still a winter month under Alpine conditions, while April is excellent for ski-ing in any locality over 3,000 ft. high, a fact all those would do well to remember whose holiday cannot be arranged for the conventional season. Of course it will be necessary to make inquiries as to which hotels are open after the end of March.

The preparations of the beginner consist chiefly in ordering rooms at his hotel and in attending carefully to the most important items of outfit—boots and ski (with the bindings). Whether good ski at reasonable prices are

already obtainable in London I do not know; the clubs are probably willing to give information on this point. Otherwise the best plan is to order ski from an outfitter in Munich, Vienna, or Berne, who will forward them to one's hotel (C.O.D.) All other articles of outfit can be bought on the spot, and many items (except gloves) are of secondary importance to the beginner in his first season. On these he can save to begin with, and improve on them later as his growing needs or experience suggest. An old pair of strong, smooth trousers, a bandage to close them at the boot, and a khaki jacket will make a better ski-costume than the most expensive Norfolk suit of fluffy homespun.

The expert will, of course, study books and maps before he goes anywhere, make careful inquiries as to inns, huts, or guides, and start with his own individual outfit carefully thought out to the last button.

From the accompanying photographs of ski-country it will be seen that good ground is either white or black and white, or distinctly spotted. Dark surfaces are manifestly impossible, while greyish mountain-sides are sure to be very bad. The grey, or "blotchy," appearance of unsatisfactory slopes is due to the thorough mixture of white and black, to rocks, stones, bare patches, stumps, branches, &c., piercing the snow in too close proximity to each other. On the other

hand, a strong contrast between the resplendent snow and the dark patches or small dots, be they ever so numerous, proves that there is plenty of room and to spare for the ski-runner to move about.

O. Hengst.

WHITE SKI-GROUND: ST. CHRISTOPH.

J. Herold.

GOOD SKI-COUNTRY.

J. Herold.

J. Herold.

GOOD SKI-COUNTRY (AT KITZBÜHEL).

F. Heiold.

SKI-COUNTRY: KITZBÜHEL.

To face p. 25.

OUTFIT

ONLY general principles are sketched which may serve as a guide when purchasing articles of outfit or when scanning the catalogues. Insist that you are supplied in accordance with these principles, and for the rest trust to a good firm.

Ski.—Pay anything near 25s. to a reliable firm (*i.e.*, such as are allowed to advertise in the English ski periodicals) in order to obtain a good pair, including the bindings. For a sum between 23s. and 30s. you should get ski which are sound in all essential respects—that is to say, properly shaped in bend and arch, perfectly straight, and not liable to warp (*i.e.*, if not placed near the stove). The bindings will be durable. Such ski a reliable firm ought to supply; but all special excellence in the grain of the wood, in hardness, lightness, and elasticity, must be paid for accordingly. After your first season you will have developed your own judgment and individual taste, so that if your ski are not broken you can sell them and select a pair of nobler breed.

Fight shy of what is cheap and of the battered specimens which have done service to generations of runners and are let out at high charges by philanthropic hotels. Bad or crooked ski with distorted bindings can be managed by experts, but a beginner should never learn on such. They are the most frequent source of failure and subsequent discouragement. Many well fitted for the sport and eager to taste its joys—apparent to even the most casual observer—have thus been treacherously robbed of their great chance.

The Length of the Ski and the Fit of the Binding [see below] are the most important items for the beginner, and about these he must take trouble. I am here speaking only of *normal* ski, and by "short" and "long" mean such as are within the normal range, neither abnormally short nor exceedingly long. A "long" ski is one the point of which can just be reached by the tips of the fingers when standing beside it and stretching one's arm as far as it will go—that is about 17 in. above one's own height. The "short" ski ends about 6 in. above the head. In the case of a man 5 ft. 11 in. in height the measurements would be as follows:—

Long ski, to finger tip (71 in. + 17 in.) = 88 in. (7 ft. 4 in.)
Medium ski, to wrist (71 „ + 8 „) = 79 „ (6 „ 7 „)
Short ski, 6 in. above head ... ... (71 „ + 6 „) = 76 „ (6 „ 4 „)

Long ski are not good for the beginner, except on the level or on gentle slopes. For average skill in all exercises (except jumping) I recommend the short or medium size. They need not be, and for mountaineering they should not be, longer (*i.e.*, not reach above the wrist). People with stiff or short legs should take short ski, as otherwise certain necessary movements (*i.e.*, the kick-turn) become difficult or impossible.

The beginner need not at first trouble himself much about such details as the presence or absence of the groove (most ski have it), the type of binding (toe or sole). Taking *all* exercises and all special requirements into consideration, the balance of advantage and disadvantage comes out equal in the end. Only jumping makes an exception.

Bindings.—Their name is legion, but the four shown on pages 28 to 30 have stood the test of time and public favour. None of these are in any way dangerous to the foot when properly adjusted. They are of two main types—toe-bindings (Huitfeldt, Ellefsen), and sole-bindings (Alpine, Bilgeri).

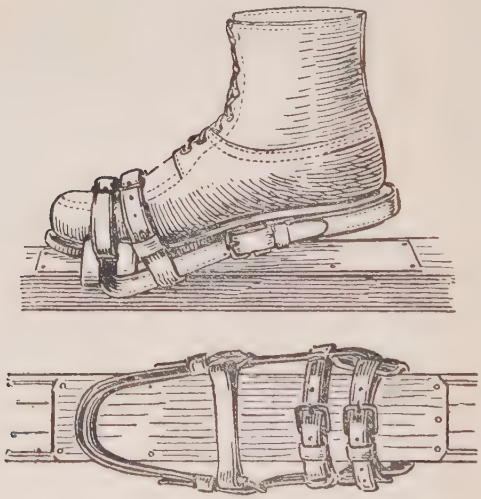
In use the two types are chiefly distinguished by a different kind of "feel," which gives each class an advantage for special movements (stemming, swings, curves, jumping). But the difference is slight in the long run. The ideal binding, which is best in all respects, has not

yet been invented, and, as far as I can judge, physical laws are against its ever being invented.

When ordering ski give your ski-ing boots, or send an outline of the sole, so that the right size can be found for you. In all the bindings the inner rim of the toe-strap must not come back beyond the root of the toes.

Get your boots before getting the binding.

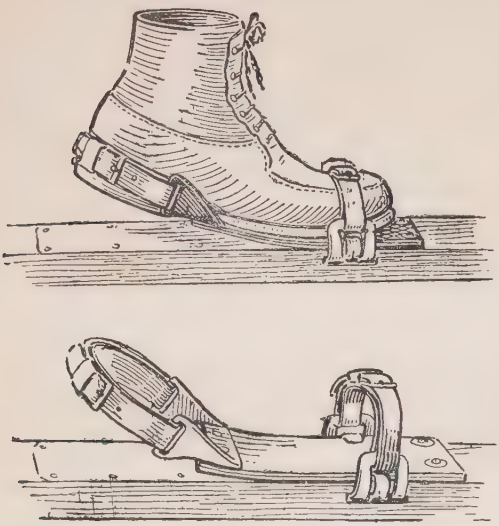
Toe-bindings.—The final adjustment of toe-bindings is by bending or hammering the toe-



Huitfeldt Binding (Left Foot).

clamps. The object of the heel-strap is to wedge the sole of the boot (not the soft sides of the foot)

tightly into the toe-clamps. It may aptly be said that one has to grow into a toe-binding, but once this has been accomplished there are many points

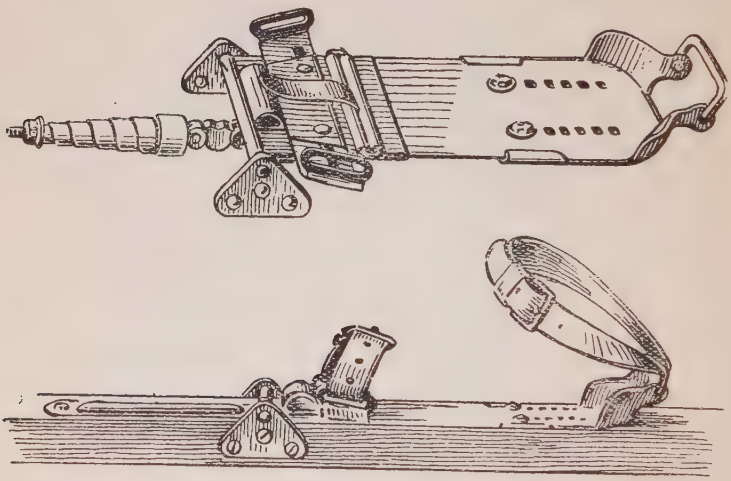


Ellefsen Binding.

in its favour, especially its lightness. For this reason my advice is neither to lend nor to borrow them. Hob-nailed boots can be worn, but make a good fit more difficult.

Sole-bindings.—These are adjusted by screws. See that a thick visiting-card can be freely pushed between the axle by which the metal sole revolves and the ski, more especially if you have bought them yourself and given them to the village

carpenter to fix to your blades. No special foot-gear is needed, so that these bindings are very convenient for hob-nailed mountain boots.



ALPINE OR LILIENFELD BINDING.

BILGERI BINDING.

I may have a personal predilection for sole-bindings, but I have no prejudice against the other kind. Long experience, however, justifies me in recommending a sole-binding to all begin-

ners whose holiday is short and who wish to climb as soon as possible. It is easily adjusted once for all, and enables one to master quickly such movements as stemming and curving, which are so important to the "mere tourist."

Sticks are of many kinds. Any stiff pole reaching at least as high as the shoulder and without a disc is good for all beginners and most mountaineers.

Boots must be big enough to hold a pair of very thick socks and one or two pairs of thin socks besides. For toe-bindings the sole must be strong and project a little round the rim.

Take good care that your boots are big enough and a good fit; impress upon the maker the size and number of your socks. For all other garments there are makeshifts, but none for boots. Good boots mean pleasure, comfort, and are, above all, a safeguard against frost-bite.

If you need new boots, get them before you get your bindings. Soak new boots well in water and grease three to four times until no longer thirsty, then only once or twice a week.

Socks.—Special rough and hard socks of goat's hair are the best. In addition have thin cotton socks, and, if possible, a plentiful supply of cobweb socks, which are more or less shapeless bags costing about a penny a pair (in Austria and Germany they are sold in tourist shops under

the name of "Schweissauger"). The usual order is two thin socks nearest the skin and the thick ones on the top. I prefer in cold weather to wear the thin socks over the thick ones, more especially during long tours when the night is spent in huts, &c. On cold days the perspiration (there is always some) collects near the boot and one will find that the innermost layer is quite dry while the outer one may be wringing wet. Obviously it is better to keep the thick socks dry as the others can be dried very quickly near a fire, while a spare pair, being so light, is easily carried in the rucksack. The difficulty is to get socks large enough to go over all the others, while many people dislike the rough goat's hair next the skin.

Clothes.—The material for jacket and knickers (or trousers) must be smooth and wind-proof. Hairy stuff collects the snow. Neck and sleeves should be capable of being tightly closed. The contents of the pockets are secured against loss by flaps and buttons.

Gloves should be "fistlings"—*i.e.*, baby-gloves—with one compartment for the four fingers. Let them be thick, and avoid hairy ones. Two pairs is the minimum, as the ski-runner must always carry dry gloves on the practice-ground as well as on tour. Three pairs are the proper allowance, so that one is always being dried at home.

Puttees or something else must prevent the

snow from getting into one's boots. Puttees are easily dried and allow one to dispense with stockings. A short band is sufficient to close the top of the boot if one wears trousers instead of knickers.

Sweater.—Do not wear it as an outer garment. Only experts can hope to keep it dry, and even they only while the sun shines. The snow clings to it, and in wind it is as good as nothing.

Waistcoat, sweater, or jersey of thick wool should be taken in the rucksack and put on *under* the jacket when it gets cold.

Wind-jacket is made of waterproof silk or a special kind of linen. Very useful.

Headgear.—One must have a shade for one's eyes and protection from cold winds. A cap with a shield in front and flaps for the ears combines both. Mountaineers frequently carry a "glacier-hat" for the heat and glare. It is made of wire and white material and folds up into a very small size. In such a case the rucksack must contain a snow-helmet or Engadine cap to put on when the run down begins. Even when there is no wind the descent causes an uncomfortable draught.

Rucksack.—This ancient and modernised knapsack of the Alpine peasant is the best for carrying things. It should be large so that the contents—soft clothes next the back—can be packed *flat*. You will never see a mountaineer

with a bursting ball balancing on his shoulders, but with a broad package which lies low down and flat against his back.

Do not be tempted by the expensive, heavy mackintosh bags sometimes offered in London.

Goggles either of smoked or yellow (Hallauer) glass are an absolute necessity. Snow-blindness is dangerous. Put them on the moment the glare becomes uncomfortable.

Ointment.—A "glacier salve" ("Nivalin" is the best) is necessary to prevent serious blistering of the face (and even hands) in the continued glare of sun and snow. Put it on soon enough and do not imagine that you need not use it at a height of 8,000 ft. because you did not require it at 5,000 ft.

Sealskin Strips with various kinds of fastenings are the most valuable aid for going uphill, saving much energy. They must fit the ski well, else they will come off and cause a lot of worry. I prefer those with rings which are tied together with string. On the mountain-top I take my long knife and cut the string, shake off the skins and pack them in the rucksack. All this can be done without pulling off one's gloves.

Knife.—A tourist always carries a strong knife with a blade for scraping his ski and cutting string, bread, &c. A few implements on it are useful, such as screwdriver, punch, &c. Ski-

runners are not supposed to need a corkscrew, as drinks are best taken in an aluminium bottle. Old hands have often, besides the clasp-knife, a dagger in a safe sheath dangling from the back buckle of their trousers. It is always ready to hand, and for cleaning ski it is ideal.

Maps of the country you intend to visitwill teach you many things. Special ski-maps have been published for certain districts of Bavaria and for the surroundings of Kitzbühel. They are easy to read and show at a glance where one may or must go.

Compass.—Use it often in conjunction with the map.

Ski-wax can be obtained hard or in tubes. It prevents sticking.

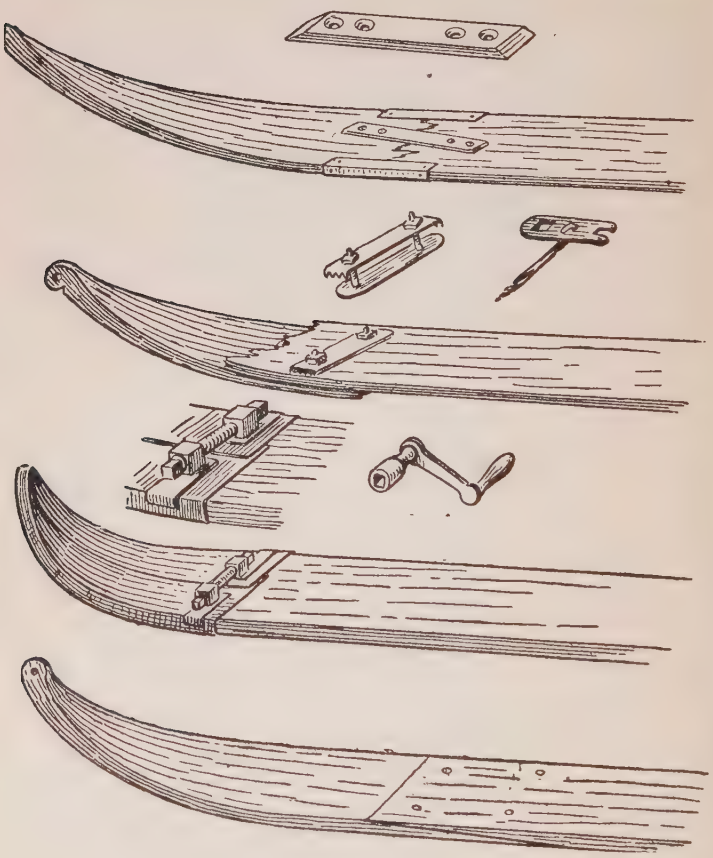
Spare Tip.—This is screwed on to the broken point of the ski to enable one to reach home without being obliged to open a carpenter's shop in a blizzard.

Bottle.—There is nothing to beat the aluminium bottle. You can heat it over a spirit-lamp.

Avalanche-drag.—A thin but strong rope 60 ft. long and dyed red, to be trailed behind the ski-runner on doubtful ground. It is meant to guide the friends of a buried man to his location under the snow. The suggestion is due to Herr Oertel at Munich who intended it, however, only for good mountaineers who were

forced by circumstances (retreat, relief-expeditions) to cross suspicious slopes.

Repairs.—The sketches explain themselves.



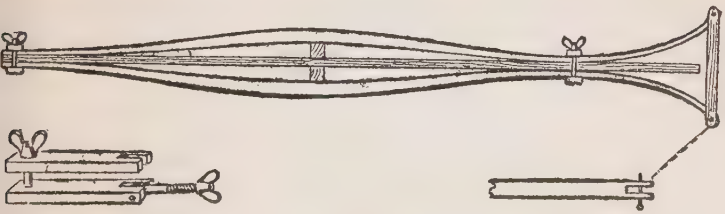
The third and fourth from the top represent a spare tip with its mechanism and key.

Food and Drink.—See list at end of book.

Odds and Ends.—Every one should have: String (5 ft. at least); a little soft wire; something with which to spread or rub on ski-wax (glove, cork); safety-pins, especially two very large and strong ones; whistle; small waterproof bags for food, matches, &c.; old newspaper for lighting fires, icing ski; spare straps for binding; key and spare screws for binding; matches; small comb; tooth-brush; tiny looking-glass; soap; court-plaster; watch; note-book; money; pipe and tobacco; and last, not least, a clean handkerchief.

Ladies.—See also special chapter by Mrs. W. R. R.

At the End of the Season dry your ski, give them several coatings of linseed oil, and set them so as to preserve their shape. Instead of the



Setting Ski.

wooden screw-clasps at the bend and the extreme end, one can equally well use string. The points can be made to preserve their bend by simply

standing the ski against the wall points downward.

Oil also the metal parts of the bindings, dry and grease all boots, straps, and sealskins.

Keep everything in a cool, dry place.

FOR A PARTY.

Rope.—Use Alpine rope specially made for mountaineering.

Lantern.—A folding Alpine lantern must be carried in a party.

Cooking Apparatus.—Some serviceable patterns of aluminium are much used by Continental tourists for taking to huts, or even for making tea on a mountain-top.

Spade.—A short, light spade might be carried with advantage by a strong party, as it enables one to clear the doors of huts or to build a snow-shelter.

Motor Hoot.—This would not be a bad device for signalling.

Mountaineers who leave the snow to climb among rocks and ice will, of course, have crampons and short ice-axes.

"Club Sack."—A large waterproof bag with all the things needed by a party for ordinary excursions. It is carried by the guide or the leader. In the latter case the leader must be fed by his companions. Contents: Repairing

tools (nippers, tweezers, hammer, screwdriver), spare tip, compass, lantern, candles, medicines, surgical bandages and sticking-plaster, needles and thread, key for sardine tins, safety-pins, much string, wire, screws, nails, big drawing-pins for fixing broken sealskin, straps.

Materials for the Club Locker. — Various boot greases and oils, linseed oil, steel shavings, paraffin, shellac, methylated spirit, flat iron, ski-wax, brushes, scrapers, Alpine rope, spade, strong tools. Cards with lists of outfit, hints and dodges, warnings, &c., might be hung up in the ski-room.

STANDARD AND PROGRAMME

When thinking about the standard which you wish to attain you must remember that one cannot become a good all-round ski-runner in two years, that is to say, *good* in *all* the possible exercises of darting, stemming, curving, swinging, and jumping. The beginner need not specialise, but he must distinguish between important and secondary things according to his needs. Let him try many things in order to understand them, but give most of his time and energy to a few in order to be able to utilise them.

On the whole, we may say that the chief aim of the holiday-maker is to do good excursions. This is, at least, the safest plan upon which to model one's standard for the first winter and before one has felt one's way. It is impossible to become a good jumper during a short first season. The touring standard is the best to go by as long as one still gropes in the dark, with no clear conception of one's capacities and possibilities. At any rate, it will secure certain

pleasures, and cannot hamper one's development during future years.

So much depends upon time, taste, and individual skill that we cannot here review all the thinkable combinations. Let us assume a man or woman of ordinary agility with twelve days at their disposal. Four days are lost by the journey from England and back; on two or three days the weather or the snow may be bad. There remain at least five full days which, if properly used, are sufficient to prepare one for a moderate tour. This beginner would have to limit his practice to what is strictly necessary and follow conscientiously the instructions given in "How to Learn." Above all, take it to heart that thin, tight boots and bad ski are the most fruitful source of waste of time and energy.

Thus the question, "How long does it take to learn?" is best answered in this way: About a fortnight's holiday (from England and back) is enough for the normal individual to acquire a sufficient knowledge of ski-ing for at least one enjoyable tour to a mountain-top about 3,000 ft. above the hotel, always provided that the aim is energetically and intelligently pursued and no time wasted in "messing or fooling about."

All the rest, all further advance in safety, style, and speed, and in the art of jumping, depends on the length of holiday and the repetition of one's visits to the abodes of snow.

GOOD AND BAD SNOW

The beginner will soon find that it repays him to give thoughtful attention to the snow from the first. Let me remind him at once that snow can be good and bad in all weathers. Again, it is always different (on the same day) in different places and during the succeeding hours of the day. He must go about, therefore, and search for good snow in many places. Should he on stepping out of the hotel in the morning find a crust on the slope looking south he must explore the hill-sides facing north, east, and west. Towards midday, if there be no wind, the southern slope will probably be soft, perhaps good for running, perhaps sticky. Sun and wind are the great mixers and modellers of the snow, and between them they manage to produce a surprising variety, according to the share each takes in the work. There is no end to the possible combinations due to the longer or shorter, successive and simultaneous, strong and gentle action of these two in various places and at different

heights. They may correct or spoil each other's efforts at producing a good "floor." A little wind may just keep soft, sunny snow from becoming sticky, too much may give it an eggshell crust or make it hard like a board.

The ski-runner will therefore investigate the country round him, the open spaces and wooded ravines, slopes in the sun and in the shade, slopes to windward and in the lee, at early morning, at midday, and in the evening, higher up or lower down. The short excursions between his exercises give him many an opportunity to go further afield, and the object in view will stimulate his interest.

The beginner should shun practice fields furrowed with old ruts frozen hard and also the snow with a breaking crust. Fast running is always dangerous on such ground, and even the most daring expert treats it with diffidence. On a gentle slope, however, one need not fear a *solid* marble surface which, on the contrary, offers very good sport.

If the snow be very deep after a fresh fall, say more than a foot and a half, or covered with a thin crust, it is a good plan for a party of ski-runners to stamp and break it down, so as to obtain a beaten surface. This will generally make a splendid "rink," and if there is powdery snow under the crust the result will be highly gratifying.

Try to adapt your exercises to the snow. If you have made use of a bad day by practising walking positions on the spot and the kick-turn you can devote more time to climbing and darting when the good snow has come or been found. Bad snow is often the cause of bad habits. What cannot be done properly on it should not be done at all.

Sticky snow is enough to drive a beginner mad. The knack of worsting this terrible foe is to keep the ski smooth enough to prevent their sticking and yet not too smooth for walking and climbing. It all depends upon the degree of stickiness and the way one moves about. The only sound advice I can give is to keep moving, never to lift the ski, still less to stamp with them, but to slide and press them forward, to run downhill more steeply than usual and not to wax too much.

"Waxing" ski means providing them with a coating of greasy material, of which there are many kinds. Hard wax can only be applied to ski which have been dried at home or in the sun. The soft preparations can be spread after the ski has been wiped with a cloth. The art of waxing is intimately bound up with the knowledge of snow and weather. Only experience can give that delicate touch and instinct which tells you how far you must fight the snow with artificial means. New snow does not stick in

cold weather, nor old snow in the sun. Youngsters always rush for their ski-wax when they see snow falling. The old hand looks out of the window, and when he sees fine crystals coming down he knows that his ski are smooth enough. While walking he feels instinctively that the slight accumulation on the under side can easily be got rid of.

To scrape before starting on a run, edge one ski and place the other at right angles to it *behind* the foot, as in Figs. 77, 80 (§§ 42, 43); push back as far as it will go, then press forward from snout to end.

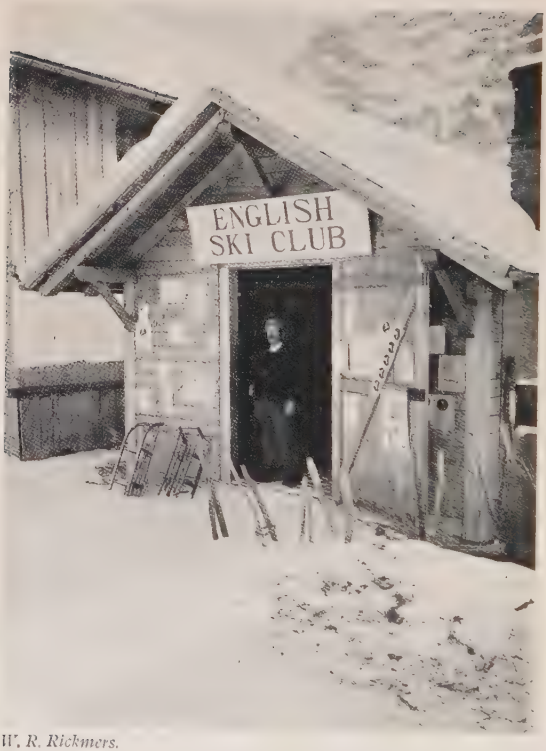
HOW TO LEARN

A MODEL programme will be found in the Crammer's List. Special attention is drawn to the importance of putting regular excursions of increasing distances in between the exercises on the practice field. Only in this way can one hope to study the ground and develop one's staying power. You may perform wonders on a slope 400 ft. long and yet collapse shamefully on the first tour. Gradual progress is essential. The crowning day of the grand climb (*your* great climb—never mind if it is only a half-day walk to some one else) must be the result of growth, not of a superhuman effort.

The most important things to do well are walking (gliding) on the level and uphill, kick-turning, darting in the three elementary positions (DS, DG, DB) on moderate slopes, slanting and stemming on steep slopes. Whoever has reasonable control over these (*i.e.*, does not fall more than once to every 200 yards, or eight times in a mile of run), and sufficient stamina

A. Lunn
Taken up

A Practice-field (at Wengern Alp).



W. R. Rickmers.

THE OLD CLUB AT ADELBODEN.

To face p. 47.

to keep this up for two miles downhill after a slow climb of four hours, may be trusted to join one of the easy day tours.

Begin every exercise slowly and with short steps. Wherever possible practise every position or movement first on the spot, on the level, on the slope, and then in a run. Pay attention to detail and endeavour to get the correct position, for a faulty attitude and waste of energy go hand in hand. Do not skip your task and hurry, but trust that speed will come unconsciously. Practise alternately with a stick and without one. Keep to a fixed set of exercises, vary these, and combine them until you have brought the whole set up to touring standard. If you experience continuous failure in one exercise, leave it for a while and try another of your programme, but don't attempt at once everything described in this book. You are but a caterpillar which can hardly crawl, and not the perfect butterfly which lightly flits from slope to slope to taste of every flower of ski-ing. Nevertheless, at the end of a strenuous day a little swinging and jumping will be a useful and agreeable diversion.

All movements must be flowing, liquid, like those of a sailing-boat; not jerky like the sudden starts and bumps of a train being shunted. Balance, and even motion are the main considerations; muscular energy is rarely needed.

Whenever you seem to face a hopeless difficulty, try to think out what may be wrong. It is generally something which has hitherto escaped your notice, such as the length of your ski, the fit of the binding, the state of the snow, or, it may be, a misinterpretation of the rules (see Crammer's List).

Do not start with yesterday's record the first thing in the morning, but begin with easier exercises in order to feel your legs, and, above all, the snow, which may have changed a good deal.

Never dash down a steep slope before you have learnt to be quite steady and to stop well on a gentler one. The terrific speed and the double somersault sometimes leave a slight nervousness, which may often account for a later inability to acquire the knack of smart darting. The risk, too, of a sprain is greater, owing to the clumsy and frantic efforts of the beginner to stop himself.

Cultivate a certain independence of judgment. Do not run in the wake of some one who happens to be in front, or follow any old track in the snow, but plan your own route according to your own capacity. If, however, you are in a class, or with a party, obey the teacher or the leader, even if you pay him, for then you will get more out of him and out of yourself.

In short, with a definite and limited task

before you, with a little attention, patience, and discipline, you will find ski-ing very easy indeed.

Ladies can and should ski as well as men, especially if they are reasonable enough to wear knickerbockers instead of a skirt.

With the sole exception of the jumping hill, the rule is that the ski-runner has to look out for things or people below him and get out of their way. Trees will hardly ever budge when you shout "Clear the course!" or "Achtung!"

Strict warning to all beginners NOT *to employ sealskin before they have successfully climbed two or three mountains on naked ski.*

THE ELEMENTS

Names of Parts.—*Blade*—the entire wooden part of the ski.

Bend—where the blade turns upwards from the ground.

Point—the part from the extreme tip to the bend is called point or snout.

Front—the blade from foot to tip.

End—the extreme end of the blade.

Tail—the blade from foot to end.

Carrying Ski.—Always tie them firmly together "keel to keel." Support them from a shoulder strap, or throw them over like a gun. The points should be in front.

One can also trail ski like a toboggan.

A. Hacker.

FIG. 1.—STRAPPING.

A. Hacker.

FIG. 2.—HOW TO GET UP.

To face p. 50.

A. Hacker.

FIG. 3.—FIRST POSITION. (FP.)

A. Hacker.

FIG. 4.—*WRONG!*

Strapping (Fig. 1).—When a good binding is made to the boot or properly adjusted and carefully put on, it must allow one to kneel. Whatever the binding, the two strict rules as to the toe-strap are the same; it must never be very tight and the foot must not come too far under it. The heel-strap of *toe*-bindings must be very tight; the heel-strap of *sole*-bindings ought *not* to be tight.

Your bindings must be correctly fitted from the first and continually kept in good order. Whoever has taken trouble with the initial adjustment of his binding and keeps it in good repair will always be able to strap it on quickly and without pulling off his gloves.

Falling and Precautions. — Investigate the practice field looking for pegs, stones, and similar objects near the surface of the snow. Beware of slopes ending suddenly on the flat as you may be thrown with great violence. Most accidents to beginners happen on the level after a steep run at high speed. On an incline the impetus loses itself in a prolonged slide and tumble, whereas the sudden stop against level ground produces a strong shock. Nothing is, on the whole, more harmless than a somersault on a steep slope, although there are pedagogic reasons which make it undesirable.

Pay attention to the state of the snow; if it is crusted or very pasty do not attempt fast

runs. When falling keep your joints loose and let yourself roll without any effort to save yourself. After getting up shake the snow from your clothes and gloves. Should your ski-point be broken then the first thing before leaving the scene of the disaster, even before getting up, is to look for the missing point, as otherwise it may not be found until the snow has melted in the spring.

Do not use your ski as a bridge. When a ditch is met with step across it sideways.

Remember that accidents are not due to ski, bindings, ground, or snow, but to improper use or want of caution, and last, not least, to "accident."

How to Get Up (Fig. 2).—You cannot raise yourself on ski which point downhill either in front or behind. Disentangle yourself and your planks. Roll, wriggle, or turn over, so that you lie with your side on the slope. Place the ski below you horizontally, so that they cannot bolt from under you. Then get your body forward in front of the feet and rise. *Lay* the stick on the snow ; do not plant it upright as if you wished to climb the greased pole.

§ 1. (FP) **First Position — Stand Still !** (Fig. 3).—The weight is on the ball of the foot, which is the part just behind the toes, where the foot bends. The heels not to be raised from the ski. Erect carriage, but not stiff.

A. Hacker.

FIG. 5.—PUSH ! (WP, right.)

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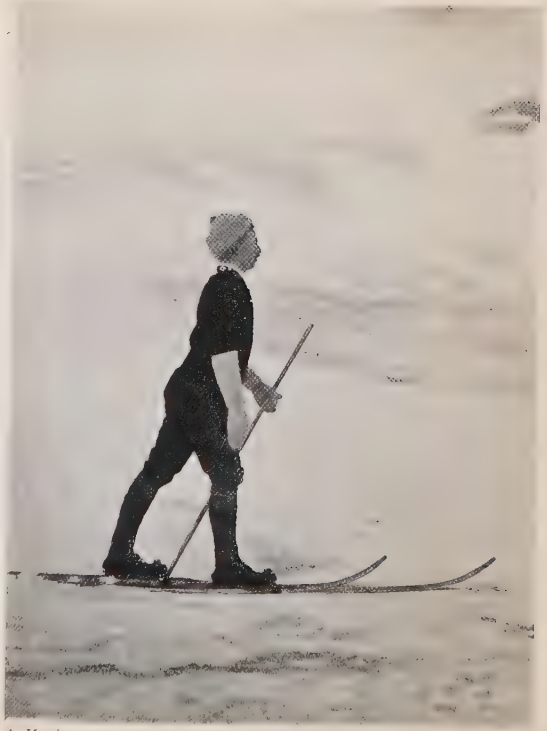
FIG. 6.—LUNGE ! (WL, right.)

A. Hacker.

FIG. 7.



A. Hacker.

FIG. 8.

WRONG STRIDES.

To face p. 53.

See p. 54.

§ 2. **How Not to Stand** — leaning back (Fig. 4).—Do not rest the weight of your body on the heels.

This exercise shows the beginner what is meant by "leaning back," which makes the ski bolt from under him. The command "Stand Forward!" therefore means that the *standing foot* is to rest on the ball although the heel touches the ski and must not be lifted from it. In FP the feet are together ; both are equally weighted in the same manner. In "Stand Forward!" (Darting, § 13) the back foot is the one on which one stands and to it therefore the command applies. So in all ski exercises "Stand Forward!" means that one should stand on the ball of the weighted foot.

§ 3. **Walking.**—In all walking and climbing it is highly desirable to *slide* over the snow, to press the ski forward, and to avoid lifting it as much as one possibly can. For this reason the ski must be smooth enough, but not too slippery either.

§ 4. (WP) **Push !** (Fig. 5).—From the first position (FP) push one leg forward ; stand on back foot. A short step is quite sufficient ; if too long the next movement becomes difficult or impossible.

§ 5. (WL) **Lunge !** (Figs. 6, 9, 28).—Throw your weight well forward on to the advancing leg. This lunge ought to make the

front ski slide forward a few inches or several feet according to the state of the snow or the skill of the expert. The important point is to lift the weight suddenly and entirely off the back ski.

It is well, when practising, to exaggerate this movement somewhat, not by long steps or hurry, but by a deliberate bending of the knee and energetic throwing forward of the body. WP and WG make the stride. The two movements are separated in order to teach the distribution of weight. Gradually the one merges into the other. Careful attention to these elements will produce a fast and steady walker, especially on the level. Length of stride (Fig. 10) is obtained by this move, not by a long WP.

Bad Stride (Figs. 7, 8).—The weight has been changed too soon or is indifferently distributed. This makes the ski-runner slide backwards or stumble. The stick is used in a clumsy fashion.

§ 6. **Uphill** (Figs. 11, 12).—Do not attempt to climb a slope "straight in the face," but go *across* it and slightly upwards, choosing a convenient angle which does not let your ski slip back. Go exactly as you would on the level and lunge well forward. *Lay* the point of the stick upon the snow at your side. Fig. 85 shows well how the stick is held and how the lower hand goes the nearer the slope the steeper it is. This is called "Stick Short."

A. Hacker.

FIG. 9.—WALKING.

To face p. 54.

A. Hacker.

FIG. 10.—GOING FAST.

A. Hacker.

FIG. 11.—GOING UPHILL.

See p. 54.

W. R. Rickmers.

FIG. 12.—TACKING.

See p. 54.

A. Hacker.

FIG. 13.—SWING BACK!

A. Hacker.

FIG. 14.—LIFT!

KICK-TURN TO THE LEFT.

To face p. 55.

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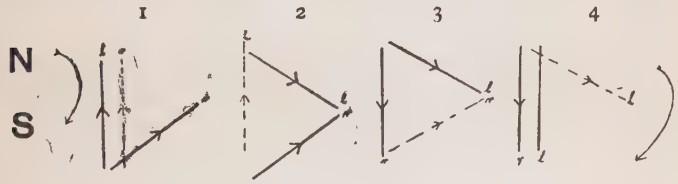
§ 7. **Turning Round on the Spot.**—On perfectly level ground there is a lazy way for people who take most pains. It consists in making wide angles with the ski by alternately approaching the points and the ends. Thus one will face in the opposite direction after three or four moves. The closer one brings the ski together at the angle the lesser the number of moves with the same amount of straddle. I only mention this movement here because it teaches a principle, namely, that of saving straddle by keeping the points together whenever one is obliged to separate the ends. One can also jump round.



Facing South in Four Moves.

§ 8. The best way—the only way on a slope—is the kick-turn. Few things in ski-ing are so badly done, none are so easy when properly understood and methodically executed. As the kick-turn discourages many who are a little stiff, it is well to insist that close attention to detail and the selection of shorter ski rob it of most of its terrors. Good turning on tour saves much annoyance to others, quite apart from the trouble, time, and fatigue to oneself.

It should first be practised on the level, the side of the stick representing the slope or mountain-side.

§ 9. **Kick-turn** (Figs. 13 to 26).—Stand firmly in the first position FP. Hold the stick slantwise across the breast (Fig. 13), embedding the point well into the snow. The upper hand ("off-side") grasps the pole with knuckles down, the lower hand (the one nearest the point) has knuckles up. Turning always begins with the off-ski—that is to say, away from the stick and slope.

It is important to stand well and securely before beginning to turn, especially on a slope. The ski must be horizontal—viz., at right angles to the dip of the mountain—so that they cannot slip in any direction (*cf.* Figs. 25, 26). Much bungling is due to inattention in this respect.

Whenever a stick is used in both hands (also in slanting, stemming, &c.), it must be held as described above. Do not carry it in both palms turned up as one would a balancing-pole or a baby. The reason for this is that the lower hand receives all strains—the weight of the body from above and the resistance of the ground from below. The least jerk will cause you to release a wrong hold.

Swing Back! (Fig. 13).—Shove back the turning-ski a little by a pendulum swing from the hip. The kick-turn shown in all its phases

A. Hacker.

FIG. 15.—*WRONG!*

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FIG. 16.—*WRONG!*

BAD LIFTING IN A KICK-TURN TO THE RIGHT.

To face p. 56. See p. 57.

A. Hacker.

FIG. 17.—TURN !

A. Hacker.

FIG. 18.—THE STRAIN.

KICK-TURN TO THE LEFT.

A. Hacker.

FIG. 19.—CHANGE STICK!

A. Hacker.

FIG. 20.—FOLLOW UP! (1)

KICK-TURN TO THE LEFT.

See p. 58.

A. Hacker.

FIG. 21.—FOLLOW UP! (2)
KICK-TURN TO THE LEFT.

To face p. 57.

A. Hacker.

FIG. 22.
WRONG FOLLOW-UP IN A KICK-TURN TO THE RIGHT.

See p. 58.

(Figs. 13, 14; 17 to 21) is to the left—*i.e.*, slope and stick are on the right and the left leg begins.

Lift! (Fig. 14).—Swing forward and lift the ski into an upright position, end of turning ski to bend of the other and close to it. The turning leg to be perfectly straight.

Bad Lifting (Figs. 15, 16).—Fig. 15: The end of the turning ski is too far away, and the leg is bent. This will cause a "crossed" position in the strain. The stick is on the wrong side and too far behind. It will interfere with the turn.

Fig. 16: The end too near. Result: a straddle in the next position. Stick on the wrong side.

Turn! (Fig. 17, also kick-turn to right, Fig. 23).—Simply endeavour to face the opposite way by a swing of the upper body. The ski will follow. Keep the leg straight.

The turning ski comes down into the strained position (Fig. 18). Most beginners try to force the ski round and let the body follow suit. It is much easier to think that your intention, from the first, is to look the other way. Therefore try to turn face and body to the opposite direction with a little deliberate swing, which must, however, not be violent or jerky.

The Strain (Fig. 18).—In this position the knees may be slightly bent to ease the strain. The ski must lie close and parallel.

Change Stick! (Fig. 19).—Take the stick round to the opposite side of the body, that is to say, change it right over and place the point into the same place on the snow where it was before.

Follow Up! (Figs. 20, 21; also kick-turn to right, Fig. 24).—Rest your weight entirely on the outside ski (off-side, the former turning ski). Keep the other leg straight, lift it ever so little and twist it round. The following ski will then come alongside without effort. This movement is surprisingly easy when the following ski is well released of all weight, the knee not bent, and all unnecessary lifting avoided.

Wrong Way of Following Up (Fig. 22).—The knee was bent and the ski-point goes into the snow.

Done!—End up in FP.—We have turned round and are now with our other side to the stick and slope. Reversing the exercise—for the sake of practice—the right leg now begins the series of movements.

The more carefully each succeeding phase is practised, the sooner speed and easy flow of the whole will come of themselves. Gradually the pauses will dwindle and the positions be bound together. Remember that smart execution can never be attained by slurring over the detail. The whole must be a graceful merging (transition), not a blur.

There are many varieties of the kick-turn and

A. Hacker.

FIG. 23.—TURN!

A. Hacker.

FIG. 24. FOLLOW UP!

KICK-TURN TO THE *RIGHT*.

To face p. 58.

H. Hoek.

FIG. 25.—KICK-TURN ON A STEEP SLOPE.

To face p. 59.

A. Hacker.

FIG. 26.—KICK-TURN ON THE SLOPE.

many ways of simplifying or hastening it, well set forth by Zdarsky and others. As described here, it will always be easy and safe. The beginner will soon find out for himself how to do it without a pole or how to handle the double stick.

Terms of Running.—To *dart*—to descend, with parallel ski in a narrow spoor.

To *slant*—to dart transversely across a slope.

To *stem*—regulating speed by forming a half-snowplough with the ski.

To *curve*—to make short circular swoops.

To *swing*—to swish round at full speed.

§ 10. **To Climb a Slope.**—Walk slightly upwards across the slope and make a kick-turn at the corner. The ascending ski-runner is a ship tacking against a head-wind which is the slope (Fig. 12).

§ 11. **The Use of the Stick.**—E. C. Richardson ("Ski-running," p. 45) says: "Begin by carrying a stick in the hand, but use it only to overcome a difficulty. Endeavour to be as independent of it as possible, and practise sometimes without it."

Long Stick.—For the beginner a *stiff* pole of about his own height is the most comfortable friend. It is a great help in the kick-turn, and removes the temptation to stoop in stemming. In all running exercises the stick is not a *prop* but a *feeler*, which is a good reason why it should not bend. When walking the beginner ought to

lay the point on the snow and paddle, not stick it in as if punting.

Short Stick and Double Stick and their use for propelling oneself require superior skill and experience. The very short, thin bamboo with a light disc is fitly called a "swagger stick," and should only be seen in the hands of those who can justly claim it as a symbol of dignity.

§ 12. **Darting.**—All running with close, parallel ski is darting. Some call it glissading or straight running.

Climb a gentle slope and start from a flat place at the top. The ski must be "locked," *i.e.*, so close together that they are as one and leave but a single streak in the snow.

The stick must on no account be used to support the weight of the body. Always keep the point a little behind you and low down, so as to avoid accidents to yourself and others. Begin with a stick, then always practise alternately with and without.

Stand straight but not stiffly. First study the positions and their "feel" on the level on the spot.

§ 13. (DS). **Stand Forward!** (Fig. 27).—Assume the WP position (§ 4) standing on the ball of the back foot. This is a kind of neutral position for beginners. It makes them less liable to sit down. Formerly this advice was called "Lean Forward!" which, however, is not suffi-

A. Hacker.

FIG. 27.—STAND FORWARD! (DS, right).

W. R. Rickmers.

FIG. 28.—GO FORWARD! (DG, right).

To face p. 60.

A. Hacker.

FIG. 29.—HOW TO STEER AND STOP.

To face p. 61

ciently clear and might cause misunderstandings, such as bending or stooping.

§ 14. (DG). **Go Forward!** (Fig. 28).—Glide downhill in the WL position (§ 5). Change from DS to DG and back during the run.

§ 15. **How to Steer and How to Stop.**—Slight changes of direction with parallel ski, very long curves, are obtained by simply leaning a little towards the side where one wishes to go.

For shorter circles use the following device: While running DS gently push the tail of the front ski away from the other. This will slacken your speed and also cause a slight change of direction. Do not make the movement suddenly nor lift the ski from the snow. Leave the point of the ski near the other ski so that a plough or wedge is formed.

§ 16. Next place your weight on the ski which you have thus moved aside. You will then feel yourself gradually coming round and finally you will stop. To stop dead on ski one must get them entirely round at right angles to the dip of the slope. The ski-runner is turned off to the side opposite the weighted ski. If one is running DSr (right foot in front), one shifts the *right* ski, places the weight of the body on it and comes round to the *left*. Compare Fig. 29 but do not make the wedge or angle quite as large as there shown. At first give plenty of room to this

exercise, *i.e.*, begin long before reaching the end and have ample space on the side where you wish to turn.

§ 17. (DB). **Stand Back!** (Figs. 30, 31).—Begin DG and "snap" into the stand-back position by stretching the front leg, bending the back leg, and locking the knees. The weight is *full* on the back foot, *heel* and all. This is the normal position of darting on a continuous slope. It is different from WP, where the knees are not locked. Practise changing from DG to DB and back, slowly at first, then smartly.

It is not always easy to lock the knees well in order to obtain perfect rigidity without stiffness and a tiring strain. A trick which I think helps one much is to make yourself slightly knock-kneed by turning the knees inwards. The one knee then fits well into the other and you will also feel that the ski-blades converge a little, vertically (very little indeed) as if to form a keel, which is rather an advantage than otherwise.

The stand-back position requires that the body should be kept taut to a certain degree in order to prevent falling backwards. The reason why the ski bolt and the runner sits down when standing on his heels is that he collapses in the knees and hips. If this is avoided, the slope's invitation to take a seat becomes less likely of ready acceptance, as the following experiment will show.

A. Hacker.

FIG. 30. (DB, left.)

A. Hacker.

FIG. 31. (DB, right, exaggerated.)

To face p. 62.

STAND BACK! (DB.)

A. Hacker.

FIG. 32.—LEANING FAR BACK.

See page 63

A. Hacker.

FIG. 33. DB: FRONT VIEW.

A. Hacker.

FIG. 34.—DB (left): TRAILING THE STICK.

See pp. 62, 63.

A. Hacker.

FIG. 35.

A. Hacker.

FIG. 36.

THE SNOW-PLOUGH.

See p. 63.

A. Hacker.

FIG. 37.

A. Hacker.

FIG. 38. (Exaggerated.)

TELEMARK-KNEE. (DT, left.)

See p. 63.

A. Hacker.

FIG. 39 — *WRONG!* BAD TELEMARK-KNEE.

A. Hacker.

FIG. 40.—CROUCHING.

See p. 64.

To face p. 63.

§ 18. Stand in FP on a level and unobstructed place. Then stand as in § 2 (How Not to Stand) and lean back like a tower (Fig. 32) holding the body very stiff and supporting it against the toe-straps. Just when the strain seems to have become unbearable and a seat imminent—you must not try anything to release the strain yourself, consciously—one ski suddenly slides back and you will find yourself in position DS or DB. If the leaning back is done briskly the one ski will recede even further and one comes down into a half-kneeling position (Fig. 37), in which a fall backwards is practically impossible.

For good position in darting compare Fig. 33.

§ 19. **Snow-plough** (Figs. 29, 35, 36).—Push the ski apart symmetrically and stand forward on both (Fig. 35). The speed is regulated by the width of the plough and by edging. Edging inwards is produced by making oneself knock-kneed (Fig. 36). Changes of direction are produced by unequal weighting of the ski, as in Fig. 29. (*cf.* §§ 15, 16). The snow-plough is useless or even dangerous for stopping a rush. On the whole it is a preventive, especially on roads. It is also a lazy mode of progress on good, firm snow.

§ 20. (DT) **Telemark-knee** (Figs. 37, 38).—So called because it is an important part of the celebrated swing. I bring it in here because it teaches elasticity.

Raise the heel well from the ski and stand on the toes of the kneeling leg. Try on the level, then on a slope, alternately kneeling right and left, rising in between. Also practice DT from DB by throwing yourself back smartly (§ 18). Once one can hold out in this position for some little time one may try guiding oneself by leaning sideways (§ 15).

Bad Kneeling (Fig. 39).—Not kneeling at all; leg stiff.

§ 21. **Crouching** (Fig. 40).—A useful position for running fast over uneven ground. You offer less resistance to the air, the centre of gravity is lower down, and you are nearer to the ground when tumbling. The shocks of the ground are met by the "feathering" of the body as it bobs up and down with the rise or fall of the snowy waves. For this reason the ski-points can be kept level (which is also more comfortable), whereas in an upright position one ski must be advanced to receive the first impact of an inequality of the ground. But one may also put one ski forward while crouching, and thus be doubly sure on a bumpy surface.

§ 22. **Practice.**—After having so far fairly mastered each position by itself, try to combine as many of them as possible in one run, always remembering to change also from "right" to "left" in the one-sided positions. Thus, for instance: DBr—DGr—DSr—DGl—DBl—DTl—

A. Hacker.

FIG. 41.—SLANTING.

See p. 65.

To face p. 64.

A. Hacker.

FIG. 42.—GOING. (SG, right.)

To face p. 65.

A. Hacker.

FIG. 43. STOP! (SS, right.)

STEMMING (right).

DBr—DTr—DGl—&c. (see Crammer's List). Confine all this to moderate slopes at first, and remember that there is still stemming to learn if you wish to go on tour.

Henceforth I shall not repeat special advice for practising. But I ask the ski-runner to recall and follow in every case the instructions given in "How to Learn," and to refer to the Crammer's List for the various combinations.

§ 23. **Slanting** (Fig. 41).—When one does not wish to take a slope "straight" one traverses it slantwise in any of the darting positions. The same rules apply. The forward foot and the point of the stick are on the side of the mountain (§§ 6, 9, 10, 11, 12, 13, 14, 15). Slanting is for the descent what walking uphill with parallel ski is for climbing; it is tacking downhill. A lean inside makes the ski cut into the slope and run up against it, so that by doing this one can guide oneself or stop.

§ 24. **Stemming.**—The importance of stemming to the average holiday-maker—say, 75 per cent. of all Anglo-Saxons who visit the Alps in winter—cannot be exaggerated. It is essentially a means to an end, and as such its value must be well understood. It is not practised for its own sake—*i.e.*, style (although it can be done in good form)—as something to look well, to startle the spectator. But stemming is the open sesame to the mountain-world, and, generally speaking, no

tourist can do without it. Therefore make haste to learn it, for two days of patient practice in this, the most useful of all ski-ing movements, will enable you to go out for a good half-day excursion among the heights. Stemming does not, and need not, retard perfection in the smart and dashing forms of our sport. On the contrary, it enables you to roam over the hills and dales. It gives you confidence to climb high, as you know that with its help you can get down safely if all else fails, and without undue fatigue. Thus it offers you opportunities to get about, and that means opportunities to try other things, to develop yourself all-round.

There is no question of "stemming" *or* "darting," for it should be both. But stemming must needs come before perfect darting, as ordinary walking comes before dancing. In this light, at least, the problem must be approached by those who were not born with ski on their feet, like the natives of Norway, Switzerland, and Tirol.

§ 25. (SG) **Going!** (Figs. 42, 44).—On a slope first slant (§ 23) DB then DG. By an outward-downward twist of leg and heel gently press down the tail of the lower ski (called the "braker"), which must softly brush the snow (*cf.* § 15). Its point is kept up near the bend of the mountain- (upper or inside) ski (called the "glider"). Go well forward (DG) on the glider, which must carry your main weight. Grasp the

A. Hacker.

FIG. 44.—GOING. (SG, left.)

A. Hacker

FIG. 45.—STOP! (SS, left.)

To face p. 66.

STEMMING (left).

W. R. Rickmers.

FIG. 46.—STEMMING ON A STEEP SLOPE. (SG, left.)

See p. 67.

W. R. Rickmers.

FIG. 47. — STEMMING. (SG, right.)

A. Hacker.

FIG. 48. (SG, right.)

A. Hacker.

FIG. 49. (SG, right.)

stick low down (with your fist near the glider-knee) and steady yourself lightly, but do not "hang" on to it by leaning back. The point of the stick is drawn through the snow at your side (§§ 6, 9, 11, &c.).

Edge the glider as little as possible (according to the state of the snow), or, rather, try with all your might to keep it *flat* on the slope. Let it point in the direction in which you wish to go. Edging will tend to alter this direction (*cf.* § 23).

Figs. 44 to 46 are of stemming "left" (SGl) —*i.e.*, stemming is named after the side on which the braker is. For the outstretched lower ski—the helm put down—is the characteristic feature of the position; with it you are stemming the tide of the slope which rushes up against you. In stemming "left" one is braking and steering with the left ski and running forward on the right. It is this position—that is to say, *running in this position*—which is called "stemming" proper. To "stem" means to move along in this manner. The next position, SS, is merely the stop.

Stemming enables one to run at all kinds of speeds. The pace depends upon the angle between the two ski, the dip of one's track, the amount of edge on the braker, and the pressure or weight (very little) one applies to the braker. Remember that the essential thing in stemming is, "heels apart," which is the customary expres-

sion, meaning that the tails of the ski must form a distinct angle or wedge (*cf.* §§ 7, 15, 16).

§ 26. (SS) **Stop!** (Figs. 43, 45).—Throw the full weight back on the lower leg and heel, that is to say, on the *tail of the braker*, entirely relieving the glider. This causes immediate standstill, provided that the stemming position was correct. This will evidently not succeed if the tail is not pressed down far enough to get the ski horizontally across the dip of the slope.

§ 27. **To Finish.**—Draw (not lift or pull) the glider down to the braker, ending up DB, then FP. Afterwards combine the two moves SS—DB—FP into one, smartly.

§ 28. (Some of the following passages are taken from my own contributions to "Ski-running," by permission of the Ski Club of Great Britain.)

Fig. 50 illustrates the proper position of the ski in stemming. The arrow *s* is the fall of the slope, for the reader is looking straight at the mountain; *d* is the direction in which the runner wishes to go obliquely across this slope. This direction is on the whole that of the glider *g*. The braker *b* brushes the snow with its entire length, thus producing a *broad* track, the direct evidence of the braking power, *i.e.*, friction. Therefore, weight *off* the braker for going, *on* for stopping. The steeper the slope the wider must be the angle formed by the two ski. The dot

p shows whereabouts the point of the pole should be—that is, a little behind the upper foot. Fig. 51 shows false positions.

Wrong Positions in Stemming (Figs. 52, 53, 54, 55).—Most faults in stemming are symptoms of an initial mistake, *i.e.*, that of leaning back on

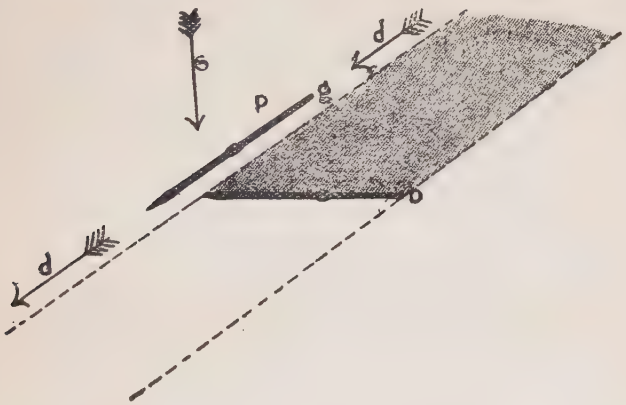
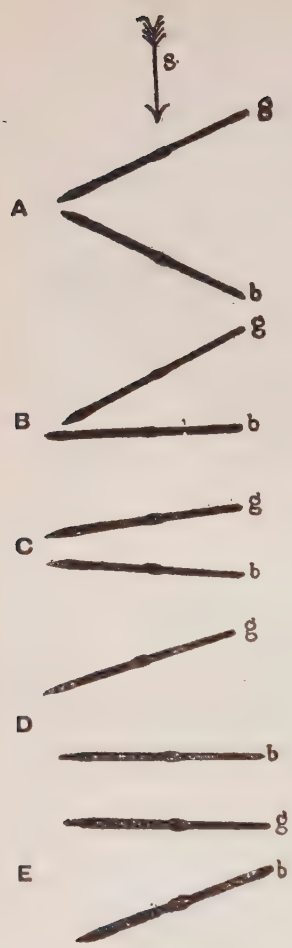


FIG. 50.—THE PROPER WAY TO STEM.

s the fall of the slope; *d* the direction of the runner's course; *g* glider; *b* braker; *p* indicates the point of the pole.
A good stemming-spoor is at once known by the broad track of the braker, which must be held horizontally.

the stick. This makes the body incline towards the slope (inside) and the ski edge into the slope. The next consequence is that the proper angle between glider and braker cannot be formed, that the ski approach into a parallel position, and that one either rushes straight down the slope or is thrown against it.



A—Points equal; braker pointing up.

B—Braker ahead.

C—Heels not sufficiently apart; points equal.

D—Points apart.

E—Points apart; heels together; braker pointing down.

FIG. 51.—WRONG STEMMING POSITIONS.

A. Hacker.

FIG. 52.

A. Hacker.

FIG. 53.

To face p. 70.

WRONG STEMMING POSITIONS.

A. Hacker.

FIG. 54.

A Hacker.

FIG. 55.

To face p. 71.

WRONG STEMMING POSITIONS.

Fig. 52.—Points apart; leaning back on the stick which is far behind.

Fig. 53.—Ski parallel; both down the slope instead of braker across it; stick long.

Fig. 54.—Leaning back; ski parallel.

Fig. 55.—Points equal; glider not ahead; not going forward on the glider, &c.

§ 29. **Curving.**—The curve in ski-ing (also called the S-turn or Alpine-turn) is short and round. It is a change of direction without stopping and obtained by *transition from one stemming position to the opposite one.* Thus a curve to the right is the change from stemming "right" to stemming "left" (§ 25). It is well to remember this and that one should therefore have full mastery over all the finesses of stemming before one attempts the curve. One must be able to regulate one's speed on the steepest slopes to a nicety and come to a halt within a few feet when going at a fair rate.

To make the circular curve exaggerate the stemming position by widening the angle formed by the ski and stand forward down the slope as if about to take a header to the bottom. The distribution of the weight is as follows: Supposing the arc of the curve to be divided into four quarters. In the first, which is the stemming position, the glider is weighted; in the second, both ski carry almost equal weight; in the third, a lean towards the *outside* (lower ski) is highly

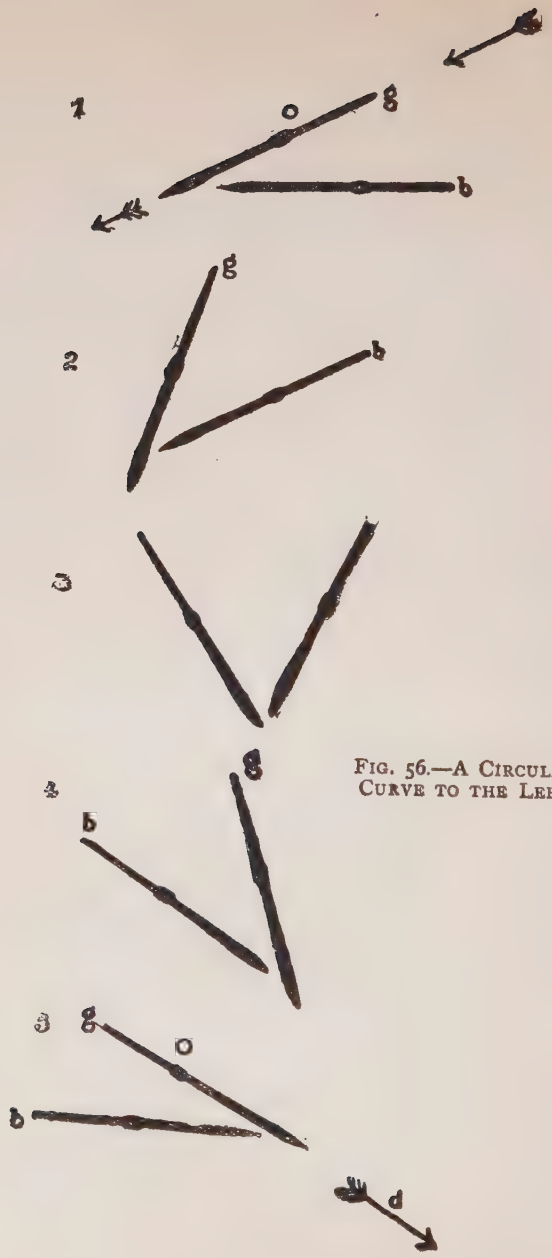


FIG. 56.—A CIRCULAR CURVE TO THE LEFT.

advantageous and facilitates getting round; in the fourth and last quarter, the opposite stemming position to the one at the beginning is assumed,

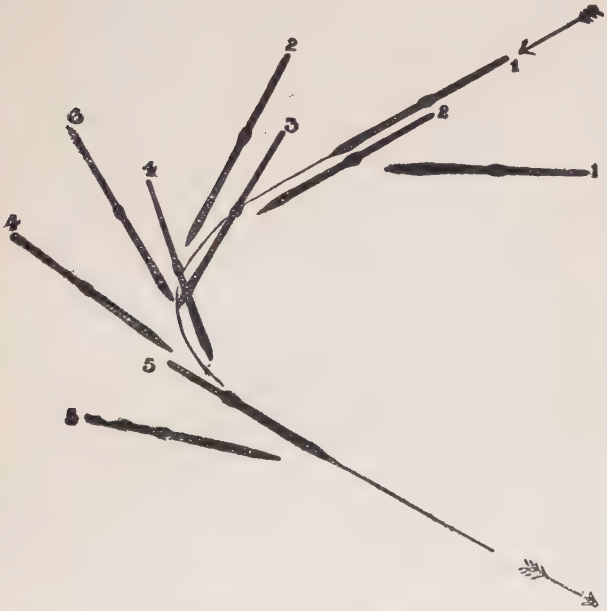


FIG. 57.—POSITIONS *a* TO *b* ARRANGED ON A CURVE.

It must, however, be remembered that in nature the movements follow so closely that the ski on the drawing would have to overlap. The sweep of a well-made curve clears a semi-lunar space with a wall of snow at its lower rim.

and the weight is therefore "inside" (on the new glider).

The steeper the slope the more one must throw the body forward, or it will press down the heel,

which prevents the tails from coming round. Keep *both* ski rigidly *flat* on the snow, hold the points together, and pull your heels apart with all your might. Change the stick to the other side of the body before half round, because at that instant one is almost stationary for half a second or so. The more one pulls the heels apart the shorter and neater the curve will be. If success does not follow it is due to some mistake such as not standing forward (one will then sit down) or edging the ski too much (they catch in the snow and overthrow the runner), or not forcing the heels sufficiently apart (which causes one to go off at a tangent instead of completing the arc). The words of command for the curve are, then: Stand forward! Ski flat! Heels apart!

§ 30. The symmetrical position is, so to speak, the key to the curve, and corresponds to the snow-plough (§ 19, Figs. 35, 36). A very slight *inward* edge on *both* ski may be applied. Any irregularity, such as edging towards the slope with both ski or one, is punished by failure. Such edging is the result of leaning back on the stick. The front of the body must look straight down the slope and the whole upright figure of the runner must stand at right angles to the dip of the slope, thus ⊻. The stick has just been changed over and is being held in readiness to touch the slope when one is further round. In going from Fig. 56 *b* to 56 *c* one,

A. Hacker.

FIG. 58. (1)

A. Hacker.

FIG. 59. (2)

AFTER PASSING THE SYMMETRICAL POSITION IN A CURVE TO THE LEFT.

To face p. 74.

See p. 75.

A. Hacker.

FIG. 60.—SLANTING. (Right.)

A. Hacker.

FIG. 61.—SWING! (Right.)

PRACTISING THE KRISTIANIA SWING.

so to speak, lets oneself sink or lean forward in a rigid and erect attitude.

Figs. 58 and 59 represent the runner in a curve to the left after having passed the snow-plough position. Fig. 58 is immediately after it or just beginning to leave it. In Fig. 59 the runner is already beginning to stem "right," and will soon place the point of the stick against the slope. Remember that the pole is not an axle which is stuck into the snow that you may girate round it. You must lay it down on the slope imagining it to be a transversal bar on which you are going to rest your inside arm from above. This is one of the many reasons why the stick should be held short (*cf.* §§ 6, 9, 11, 25).

§ 31. **Further Hints on the Curve.**—Do not rush it, but approach it warily and stem hard just before the "corner" in order to reduce speed and get the heels well apart. This also gives the necessary time to change the stick. Slide up with the lower hand, let go the upper hand, and swing the lower end of the stick into it. This simple movement often gets terribly mixed up, causing much confusion at the psychological moment of the curve. Do not put the stick into the slope too soon, but choose a spot lower down the slope where to place the point. Also hold it short, for the least bit of stick-hanging—the result mostly of a long reach—acts like poison on

the curve. The object of the pole is to steady you somewhat against the slope on your side and low down, not high up and behind.

To give a good "swish" to the curve add a little swing when coming round (*cf.* §§ 34 and 35), then continue stemming at once. In this way one curve may be joined to another so as to make a snake-line through broken ground in order to dodge obstacles or to "explore" the slope, or simply in order to prolong the pleasurable slide.

By throwing the weight completely on the braker (of the new stemming position after coming round) one gets into SS and finishes smartly as in § 27, with the addition of a little swing.

§ 32. **Side-slip.**—This is a variety of stemming, not aslant the slope in the direction of the ski, but down the dip of the slope, sideways. The upper ski must point down a little, the lower ski up, the angle, in both cases being small. In order to slide *both* ski are kept flat and equally weighted. Edging both causes an immediate halt.

By one-sided edging or weighting changes of direction and into other positions are produced. The side-slip only works well on very steep inclines and in good snow. A wrong position of the ski—especially if the upper ski points up—usually causes one to fall back. As the slope is

A. Hacker.

FIG. 62.

A. Hacker.

FIG. 63.

PRACTISING THE KRISTIANIA SWING (right)

To face p. 76

See p. 78.

R. Bichler.] [*From "Heck-Richardson."*

FIG. 64. KRISTIANIA SWING (right).

See p. 79.

To face p. 77.

steep and the snow slithery, this slip is very often followed by a rapid descent, head foremost.

§ 33. **Swings.**—When speaking of *the* swings —Kristiania and Telemark—one means those finishes to a dashing run which are done without the aid of a stick and which are *de rigueur* after a jump. Their main purpose is to look graceful, whereas the curve is, above all, useful and reliable, although there is no reason why it should be performed in an ugly manner. Any swing not carried through to a finish—merely sketched, so to speak—may be used to effect changes of direction in darting. The Telemark is very good for this, as the knee-position (§ 18) gives such steadiness.

All swings must be "drawn," not jerked. Only the beginner is allowed a little balancing with his arms. The expert must keep them still. In bad snow swings are neither pleasant nor advisable. When carrying a short stick be careful not to bring it to the front before the swing is done, as it may catch in such a way that you run against it with your face. It goes without saying that a perfect swinger, as in Fig. 70, can do as he likes without fearing injury to himself or others.

§ 34. **Stick-swing.** — As explained in the curve (*cf.* §§ 29, 30, 31) the stick steadies one against the slope. Although one does not lean on it, nor use any force, its help makes all the

difference. The stick-swing is easy and a trusty servant under all conditions of the ground or snow. Its principles are contained in the finish of SS (§ 27) and the curve (§ 31). Knowing these things, now practise them as a swing, that is to say, without the intermediary stemming angle. All you have to do is to slant and bring down the tails of the ski—keeping them locked all the time—by an outside swing of the body. Imagine that you wish to fling the train of a skirt (representing the tails of your ski) *away* from the slope, turning face and upper body *towards* the slope. This twist (Figs. 60–63), if properly done—not too little and not too much—forces the tails of the two (unseparated) ski down to the level of the points, so that the ski are horizontal in space (at right angles to the dip) which causes them to stop, as the ski-runner ought to know by this time.

As one is slanting and as the swing is done out of DB, the advanced ski is the one near the slope, which means in other words that the position for a swing to the right (the "inside" of the circle on the right) is DBr. Practise the swing on *steep* slopes, first slanting, then, after the knack has been found, more and more in the direction of the dip. Also begin with very short runs. The slanting only gives half swings but teaches one the peculiar "feel" of the knack. At last one must be able to do the full swing, which

A. Hacker.

FIG. 65.—TELEMARK-STEM (right) FOR A SWING TO THE LEFT.

A. Hacker.

FIG. 66.—TELEMARK SWING (right). SHIFTING WEIGHT TO FORWARD SKI.

See p. 79

A. Hacker.

FIG. 67.—TELEMARK SWING (left).

BEGINNING TO COME ROUND.

See pp. 79, 80.

H. P.

FIG. 68.—TRACK OF A TELEMARK SWING (right).

H. H.

FIG. 69.—TELEMARK SWING (left).

F. Herold.

To face p. 73.

FIG. 70. TELEMARK SWING (right).

swishes one round at right angles to the course. Remember that advanced ski and stick are on the side to which one wishes to swing.

§ 35. **Kristiania**.—This is the stick-swing without the help of a stick. The directions and practice are the same. Only it is much more difficult and will give little satisfaction on a gentle slope. The full swing must be studied on a fairly steep incline. The chief characteristic of the Kristiania is an erect DB position throughout (Figs. 64, 70).

§ 36. **Telemark**.—The Telemark-knee (§ 20) is the most important preparation. Rise and fall with an elastic spring, taking care to rest your weight on the kneeling leg.

§ 37. **Telemark-stem** (Fig. 65).—Though it may sound curious, there is some stemming also in this swing, or rather all swinging and stemming movements obey the same elementary law, just like rudder, keel, and lee-board. We beg leave to introduce the Telemark-stem as a help to the understanding. First try a "wrong" SG by advancing the braker a foot ahead of the glider (but otherwise correct). Then DT on the glider and run a short distance in this position. One cannot keep it up long, for pronounced stemming is always difficult on a gentle slope, all the more so when one is kneeling.

§ 38. **Telemark Swing**.—While tele-stemming transfer the weight to the braker. The result

will be a deviation to the side on which one is kneeling—*i.e.*, opposite to the advanced leg, which is therefore on the "outside" of the swing. Afterwards leave out the conscious application of stemming, that is to say, the deliberate spreading of the ski in order to form a wedge, just as we left it out in the advanced practice of the stick-swing and Kristiania. From DB enter DT and transfer weight to front ski (Fig. 66). *Wish* to do the Telemark with closed ski. You must, at any rate, begin and finish it with ski parallel and together. But one will notice that in the best of Telemarks there is always a little spreading of the tails, be it ever so slight, just when rounding the corner (Fig. 67). This is what a biologist would call the reduced organ which points to a distant relationship with stemming. Do not rise too soon after coming round as the swing takes some time to finish. The ski must be long enough, or the bend of the back ski will slip past the front foot, crossing behind it.

Comparing the Swings.—The Kristiania is brisk, short, quick; it is most effective and efficient on a steep slope. The long, stately swoop of the Telemark, with the body low down on the ground, has a peculiar æsthetic fascination of its own. Seen from a good view-point above it shows a black dot traversed by the slender arrow of extended ski.

In all swings there is necessarily a leaning

R. Schloss.

TELEMARK.

R. Schloss.

KRISTIANIA TO RIGHT.

To face p. 80.

Jeanrenoud.] *[From "Der Ski."*

FIG. 72.—LEI-BERG JUMPING. (Phase IV.)

To face p. 81.

inward of the body, but this must never be put forward as an excuse for a false position, such as stooping, crouching, or the like.

Failure in the Kristiania generally leads to a fall towards the slope, or if it has been "overdone" to a slide backwards. The unsuccessful Telemark very often results in a toppling over to the outside, especially if one rises too soon. The difficulty of the former is to get round at all, the problem in the latter is how to hold out till the end. Of all ski-ing movements the two swings are the most differentiated, being furthest apart in the evolutionary scale. Their marked individualities cannot be mistaken, and each is at its best on the right slope. The Kristiania, body at full length, and ski but little extended, rushes and swerves against the steep side of the hill, like a stout craft on a rapid river. The Telemark, like a long, slender skiff with a short man, glides majestically through a wide expanse.

§ 39. **Jumping.**—A complete absence of personal experience and proficiency makes me reluctant to give advice in this branch, even were it not for the want of space in a book chiefly devoted to touring. Jumping is an art of its own, and I cannot do better than refer those in search of full information to the exhaustive chapter in E. C. Richardson's book entitled "Ski-ing."

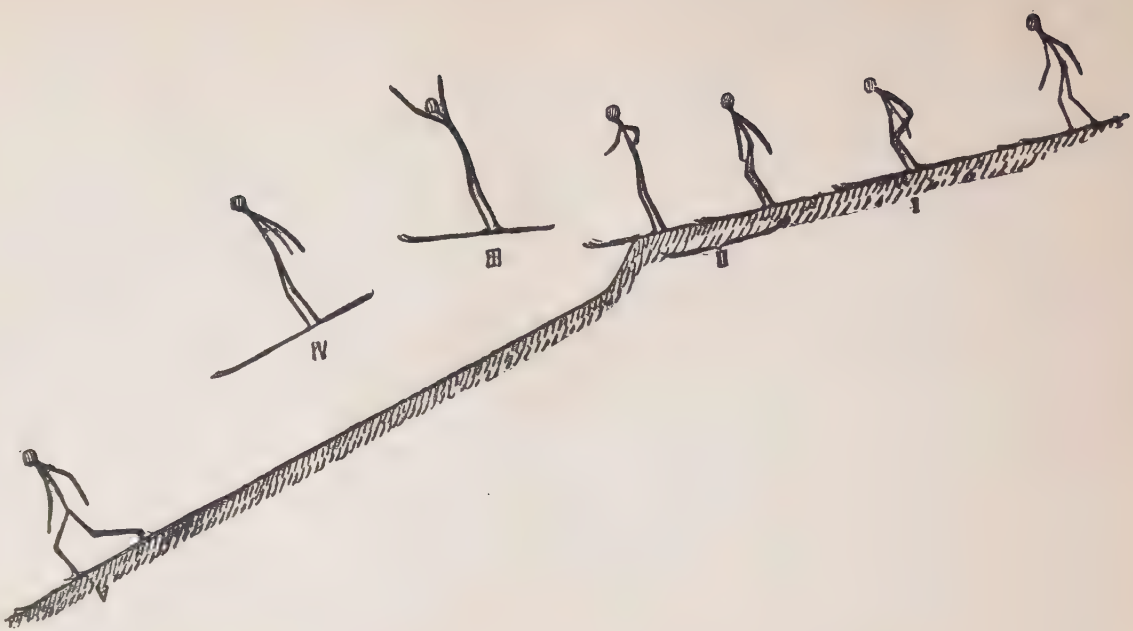
Even the tourist will profit from a little jump-

ing, say on off-days. He will derive great benefit from it. Let him construct a small projection from the slope a foot or two high. There must be a distinct *dip* or gradient, not a *flat* place below this take-off or platform. The

CROUCHING FOR THE "SATS."

surface must be beaten down by treading it with the ski, for it is dangerous to jump into deep, crusted, or sticky snow.

One does not jump as a rule with a stick in one's hand. The performance is best described as letting oneself be shot over a raised



Hoek-Richardson.

FIG. 71.—THE PHASES OF THE JUMP.

place by the impetus of a preliminary run. The legs are not drawn up, and the only thing savouring of the ordinary jump in boots is the "sats," a peculiar spring or straightening out of the body upwards and forwards. The succeeding positions are shown in the diagrams (Figs. 71, 72). On alighting make DT, then rise quickly

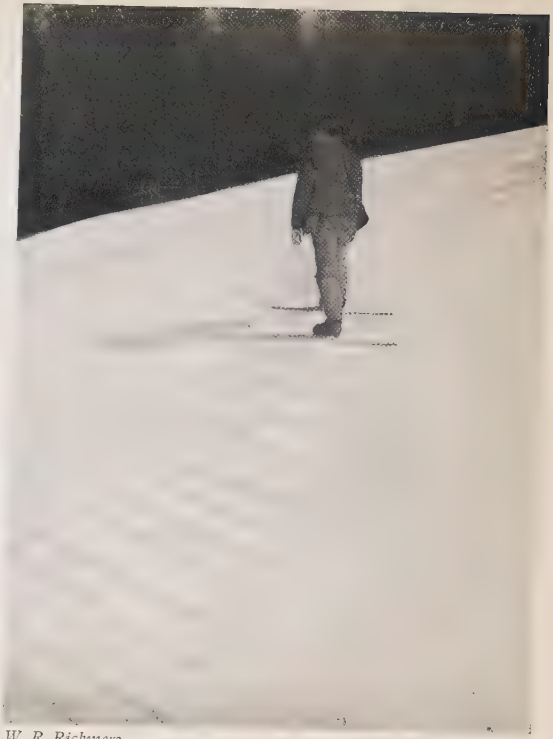
and continue DB until reaching the bottom of the hill, where a swing to the right or left must be made.

To see fine ski-jumping is like a revelation. Unfortunately few have the time or opportunity to excel in this wonderful excercise, which requires much practice and training. To all

A. Hacker.

FIG. 73.– TELE-CURVE (left).

To face p. 84.



W. R. Rickmers.

FIG. 74.—SIDE-STEPPING.

See p. 85.

H. Hoek.

FIG. 75.—SIDE-STEPPING ON A STEEP SLOPE.

A. Hacker.

FIG. 76.—SIDE-STEPPING.

See p. 85

A. Hacker.

FIG. 77. (1)

A. Hacker.

FIG. 78. (2)

HERRING-BONING.

See p. 85.

H. Hock.

FIG. 79.—HERRING-BONING.

To face p. 85.

good jumpers I must apologise for being unable to do justice here to what interests them most.

§ 40. **Tele-curve** (Fig. 73, Tele-curve to left).—To do the curve without a stick is difficult for the same reason which makes the Kristiania harder of execution than the stick-swing (§ 34). Having reached the symmetrical plough position of the ordinary curve (Figs. 35, 36, 58) bend the inside knee, which in our illustration is the left or braker-knee of the *initial* stemming position (or glider of the next). It is practically a short Telemark-swing with the heels deliberately apart. The Telemark-stem is closely allied.

§ 41. **Side-stepping** (Figs. 74, 75, 76, 85).—Step sideways, taking care to bring the tail of the ski well up. On a steep slope it will be found advantageous to have the stick below and push oneself up by it (Fig. 76). In all walking and climbing exercises a rhythmic swing of the body is far more important than laborious lifting through muscular force.

§ 42. **Herring-boning.** — (Figs. 77, 78, 79).—Energetic people sometimes like to climb in this style. But even they do not keep it up for long. The easier method (as explained to me by Herr Zdarsky) is as follows: Cross the ski at right angles (Fig. 77). Then lunge out with the uppermost ski (which is behind) until it is just clear of the other (Fig. 78).

Close up with the other leg and again strike out at right angles. In this way the greatest effect is obtained by the least straddle, and a

a is the oldest style, with very much straddle; *b* is better; *c* is with the least straddle.

further advantage is the regular relief afforded by the bringing together of the legs.

§ 43. **Starting on a Slope** (Fig. 80).—Beginners either find a level place at the top, or they begin by standing sideways, then start slanting and gradually work round to a straight course down the dip. Jumpers generally hop round or support themselves with sticks which they leave behind. The cross-start enables you to begin business deliberately from a standing position. It is also an invention of Zdarsky's. It might be called a downhill modification of Fig. 77. Go forward (DG) on the upper ski and bring the other alongside parallel as soon as it has been cleared.

§ 44. **Braking with the Stick** (Fig. 81).—Place the point outside the foot and pass the stick inside of the knee. Or grasp the stick in

A. Hacker.

FIG. 80.—CROSS-START.

A. Hacker.

FIG. 81.—BRAKING WITH THE STICK.

A. Hacker.

FIG. 82.—HOW *NOT* TO BRAKE.

A. Hacker.

FIG. 83.—A LITTLE LEGITIMATE LEANING ON THE STICK.

See p. 86.

A. Hacker.

FIG. 84.—STICK TO HIP!

See p. 87.

W. R. Rickmers.

FIG. 85.—TRAVERSING A SLOPE.

(M. Zdarsky.)

To face p. 87.

the same way—the lower hand pushing against it—but 2 ft. further down, so that the hand and point are quite near the foot, and keep the stick outside the knee.

There are various other correct methods, standing and sitting. The secret of them all is that the force of the moving body is pressed *against* the *lower* part of the stick from behind (above).

The old favourite of Fig. 82 is absolutely futile. This is called hanging on the pole. Stick brakes must be put on slowly, carefully, and before the speed is high. Otherwise the attempt may cause injury by severe knocks against the leg or face. They are only used on narrow or icy paths where there is neither room nor surface-grip for ploughing, stemming, or swinging.

§ 45. **Stick to Hip!** (Fig. 84).—Keep this command in mind when traversing steep slopes, where the ski may grip well, but where a man on his side will toboggan down with surprising swiftness. As soon as you feel that your ski are losing their hold (not a moment later) the hand nearest the slope (§§ 6, 9, &c.) glides down to the point of the stick and brings it close to the hip. The other hand reaches up as high as possible (even higher than shown in the picture) and presses the stick over against the slope in order to maintain it in an upright position. Thus

the point is forced into the snow chiefly by the weight of the fall. For this reason, especially on hard snow, not a second should be lost to have the movement "stick to hip!" (*i.e.*, point to hip) completed before the body touches the slope at your side. Later efforts may prove ineffectual.

§ 46. **Sundry.**—There are many other things that can be done on ski. One can skate on gentle slopes in order to increase one's speed by striking out. Stemming and curving can be done backwards. In crusted snow it is possible to swing by lifting out the ski. Sudden changes of direction can be effected by little jumps while running. One can throw oneself on one's back and get up again without stopping. Nimble runners after a fall will continue to run almost before they have risen from the snow. When in a hurry one may start down on a slope before the kick-turn is quite done : one stands down in the strained position, changing the stick, and following up when under weigh. Lieutenant Bilgeri has developed a system of darting with short ski, by placing one behind the other (bend of back ski treading on tail of forward ski) so as to form one single plank. He also prefers to stem with the braker in front.

The more agile a ski-runner becomes the less he will feel bound to conventional positions, for they can be varied within certain limits. The limit is where an individual adaptation ceases to

be of general interest as regards utility and form, for, as already stated, mechanical effect and the standard of grace are closely interdependent.

At competitions, however, certain conservative principles will always be insisted upon.

TACKLING THE GROUND

General Remarks.—The various positions and exercises form the ski-runner's technical outfit. His art begins when he has to bind them together into a continuous whole during a cross-country run. Each has to be chosen instinctively to meet the conditions to which it is best adapted. One must merge into the other, so as to produce an even flow like the motifs of a piece of music. It is, therefore, not out of place to speak of a ski-runner's art of composition. The changes, sometimes abrupt, which he encounters, and which he has to equalise into harmonious progress are those of the ground and the snow.

No description, however detailed and minute, can exhaust the subject or provide advice for every emergency. These things must be seen and intelligently noted. Here nothing is simpler or better than the "policy of the open eye," which I urgently recommend. The "eye for country" and the "feel for snow" grow out of a long experience. Only a wide-awake interest in his surroundings will enable the ski-runner to

enrich this experience in a short lapse of time. All I wish to do is to give a few general hints which shall start his own observations in the right direction.

The difference between the expert and the beginner is that the one can see many possibilities where the other is confronted by one, and that often an impossibility. Certain kinds of snow which sorely puzzle the tyro can still be turned to good account by the old hand, who knows how to get the best out of them, and who is probably grateful that the matter is not worse. It is ludicrous, though psychologically highly interesting, to see a beginner struggling straight up against a hill or looking in despair straight down a broad white slope. With all natives of the Alps the obvious way about is an instinct, but to the denizen of the plains every "short cut" not obstructed by walls or water is a categorical imperative of his mental organisation. When he comes to the mountains this habit takes the form of what may be called the "*idée fixe* of the dip of the slope." This, then, is the first lesson in the knowledge of hillcraft. The ski-runner can change any snow-slope, however steep, into any gradient which pleases him best. "Tacking" is the name given to every deliberate method of circumventing the dip by crossing the slope transversely and doing a kick-turn at the corner (Fig. 86). Every one, therefore, who can do the

kick-turn, slide uphill at a moderate angle, and slant on a gentle slope, is able to ascend or descend by tacking up and downhill. Nothing is simpler, yet nothing seems more difficult to the beginner than finding his own comfortable gradient.

H. Hoek.

FIG. 86.—TACKING.

Climbing.—Slipping back may be prevented to a certain extent by lifting the advancing ski and stamping it down in the forward lunge. Only the front part of the ski is lifted, the end must remain on the snow.

When following in a slippery track uphill "raise your heel." This means that you should lift up the tail of the ski (the one on the side of the slope) and cut sideways with it into the snow. At the same time push the ski forward, keeping the bend on the track. If necessary, step down

and out of the track with the front of the lower ski. The best plan of all is to ask the leader to

make a good track or to scrape one's ski if they are unreasonably smooth. Of artificial aids to climbing I shall speak in the touring chapter.

Change of Slope and Snow.—When darting down a gentle slope which ends in a steeper one

stand well back (DB) before reaching the edge and go forward (DG) on entering the steeper descent.

This will prevent you from falling on your back. As soon as you have steadied the forward-backward balance, resume the normal darting position (DB) for continuing the run as long as the slope remains uniform.

When you come from steeper to gentler ground go forward before the angle and throw yourself back on touching the lesser gradient. This saves you from tumbling on your nose. In

addition to the body balance, the advanced ski plays an important *rôle* in receiving the first impact. The other then comes forward (as in a stumble when walking) and DGr or DBr may be changed into DBl.

A "loop" is most easily met by crouching and advancing one ski.

Thus the various ups and downs of the course must be received by some preparation which

allows a margin of recovery. For this purpose the ski-runner has a whole register of graduated

positions ranging from the Telemark-knee to the "sats." Rocking backwards and forwards between these we ride the mountain's cataract. The jumper passes through all these positions very quickly and over a short distance, which explains the value of jumping practice for superior skill in darting.

The reason for all this is that the body of a ski-runner tends to retain its position in space by

the law of inertia. On the first slope the position A (at right angles to the slope) is correct. Inertia

tends to preserve it, and if I don ot counteract it this position will remain the same (in space), that is to say, too far back on the steeper hill, where B would be the proper upright position. In popular language one may express it thus, that the lesser incline which you have left, pulls you back when you reach the steeper one, while the steeper pitches you forward on to the level.

It is this transition which tends to upset the balance, the change from one angle or gradient to another. The greater the speed and the sharper the bend in the ground, the quicker and the more vigorous must be the means of tiding over the sudden change of incline. Of this the jumping-hill supplies the best demonstration.

Apart from the air pressure at high speed the steepness of the slope itself has nothing to do with difficulty of balance. Here the eye must be held responsible, owing to its direct influence upon the nerve centres of the brain. This is one reason why beginners so often fall flat on their faces. They "look forward" to a level at the bottom of a slope, whereas the expert takes sitting down with equanimity but resents being pitched on his head, fearing damage to his bones or his ski.

The same rules apply to changes in the snow. One has only to realise that different snow has different speeds. Coming from "slow" on to

W. R. Rickmers.

A Set of Curves.

To face p. 96.

"fast" snow is the same thing as coming from a lesser incline to a steeper one. A ski-runner soon learns to distinguish the chief kinds of snow by their colour and texture. This self-education leads to a severe and chaste simplicity of taste in snow, imbuing us with Puritanic horror of everything florid or elaborate. If the colour is laid on in many patches of all shades, if the texture has design or even ornament nature's artistic shroud is for us nothing but execrable stucco, a plaster of Paris wilderness. To save ourselves and our beloved planks from its baleful influence much experience and caution are necessary.

So far I have been speaking of balance only, but we also need a further control of speed than that made possible by the makeshift of "tacking." Owing to the formation of the ground and the treacherous pitfalls in the snow it is not advisable, not even possible, to keep up a uniform high speed throughout. By stemming, curving, and swinging we can check ourselves and at the same time change the direction of our course. Stemming is the wisest and most enjoyable method of tackling a steep slope whenever the final result of a darting run cannot be foreseen with reasonable probability or when speed may be dangerous owing to the state of the snow or to the presence of many obstacles.

The secret of good ski-ing down a mountain-side of intricate formation is to know exactly how

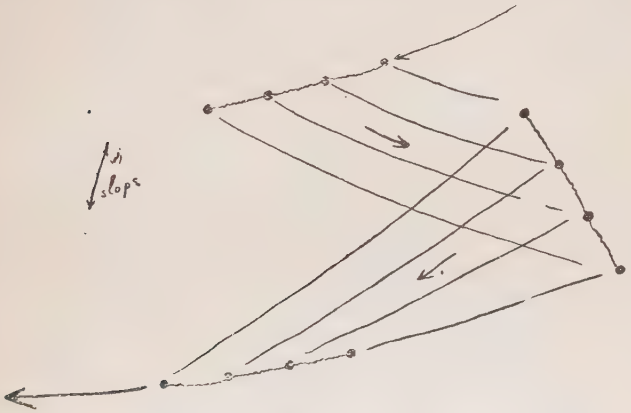
to adapt oneself to a certain typical feature of the ground. While running one must always look far ahead to survey the ground and arrange one's tactics beforehand. One must think of the snow which is likely to be found round the corner as one comes from the shade into the sun or from the lee to windward. The problem is not how to get down helter-skelter, but how to obtain the pleasing sensation of a continuous glide, that is to say, how to get down in good form, and, of course, without falling.

Approach all obstacles with due diffidence and learn to understand the peculiar "cussedness" of branches, stones, holes, pegs, and snow-waves. Slow down before all corners and unknown channels. Remember that a cool-headed and cautious man has always a good chance of keeping up with a dashing runner who may be superior in skill but lacking in discretion.

Rope-running.—This is not at all difficult. Friends who contemplate glacier tours would do well to practise some running on the rope. There should be a length of from fifteen to twenty feet between two men. As one would not dream of ski-ing on a really steep glacier a succession of moderate slopes will suffice. Ski-runners who have already acquired some freedom of action will not find the rope much in their way. The first man must keep up a uniform pace, and all guiding and braking should be done as much as

possible by snow-ploughing without the help of the stick. Let the rope be held taut, which greatly facilitates matters, for those in front will pull those behind, thus ensuring a uniform strain through the whole of the chain.

Every one pays close attention to the rope—of which a short coil may be held in one hand as an elastic margin—and to the man in front who must run easily and give early notice of every



contemplated stop or change of direction. Quick curves are not very satisfactory. When on a somewhat steeper slope zigzags have to be made, it is better to kick-turn. In this case each turns in the spot where he happens to be (the rope being stretched at full length) and then proceeds *en échelons.*

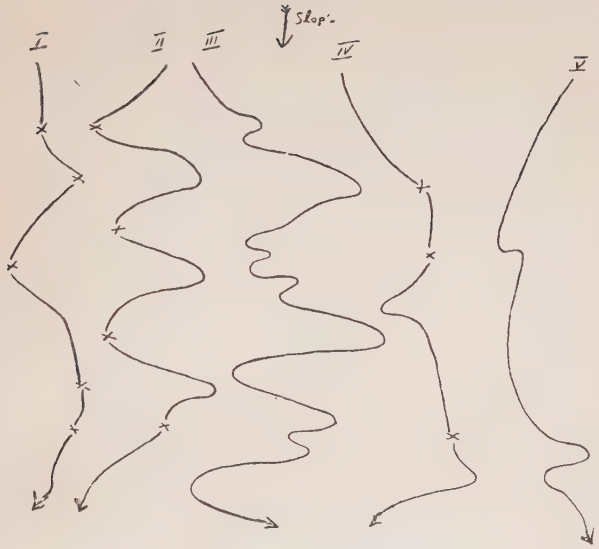
The secret of successful rope-work is the formation and "breaking in" of a team, the

units of which know exactly what is expected of them and what they have to do.

On the practice field one of the party might sometimes play the dummy and shout that he is breaking through a snow-bridge hiding a crevasse. Immediately on hearing this—on the glacier it must be seen before there is time or need to speak—the others must throw themselves down flat (Stick to Hip, § 45) and edge the ski firmly into the snow at right angles to the direction of the rope. A better method is not to throw oneself down but to edge the ski at right angles and lean away from the pull, the stick to be anchored firmly by pressing against it with one hand low down as in braking. By this method the great braking power of the ski-edge is better utilised, but it must be done quickly and correctly as, in case of failure, the standing ski-runner will "tail" merrily in the wake of his vanishing companion.

Stick and Style.—Almost before the beginner steps on to the snow he will have listened to discussions on bindings, sticks, and style. I am not going to touch the hornets' nest, but if he wishes for some guidance beyond his own common-sense and free-will let me give him the following hints :—

Every binding described in this book is good and none of them has anything to do with "style."



STARS AND STREAKS.

I. The spoor of a beginner, going down anywhere and falling frequently.

II. Slanting and stemming. Learns to curve. Misses three curves out of six.

III. A very good touring-track without falls.

IV. The hitherto cautious runner endeavours to improve his darting and often comes to grief.

V. The spoor of the perfect ski-runner. He darts gracefully where it is possible and curves where it is necessary—*i.e.*, among obstacles or on short slopes, &c.

N.B. A star is a fall.

Every kind of stick is good, long or short, single or double, if you know how to handle it. Your style remains the same whether you hold a stick in your hand or not. Its mere absence does not change bad into good form.

Every exercise in this book has its correct form, its special, good style.

Of course there is also what may be called the general smart and graceful style of the ski-runner, the result of a harmonious union, of the joining together of all the movements—in their best form—during a long descent. Undoubtedly a preponderance of sure darting will make the best impression, and from the purely athletic point of view the straight, dashing style is the most effective. Its theoretical justification may be given by a mathematical formula: The track of your descent should approach as much as possible to the bee-line from top to bottom.

But there are also considerations of utility, safety, and personal comfort, and a level-headed ski-runner will endeavour to combine these with the exigencies of style as much as he wishes to or as best he can.

TOURING

The Principles of Mountaineering.—"Of English visitors to the Alps in winter only a small minority have gone through the school of higher pedestrianism, and are therefore unable to understand properly the rules of hill-craft even if often dinned into their ears. The reason why the ski-runner who has not been a climber is unconsciously exposed to greater dangers and temptations is this, that the tourist in summer instinctively keeps to the path, and is told a thousand times to keep off the grass, whereas the ski-runner is taught to keep off the path. The latter therefore, led through trackless snow and across steep slopes by his instructors, soon becomes accustomed to roam at large, and to look down giddy places. The pedestrian of summer, however inexperienced he be, is rarely without that warning inner voice which tells him to beware when he leaves the trail of man or beast. The higher mountains awe him by their threatening contrast to the friendly forests and green

pastures whence he came, and if he tries to gain a pass or peak without a guide he avoids the slippery snow, that is to say, he follows from the valley the ever narrowing expanse of dry soil as it gradually loses itself between the ice and rocks. But he who around his hotel has become accustomed to the sight of snow, now the all-enshrouding feature of the view from the ice-bound river to the mountain's crest and crown, accustomed also to ramble without a guiding friend, book, path or fence, soon feels at home wherever he can cling to the flowing train or nestling fold of the snow-queen's magic gown. If bent on some chance journey of exploration he goes where the world is whitest, and strong in the trust that his snake-like spoor will safely show him back. Rising higher, he generally finds more snow the further he travels ; it spreads before him in large surfaces and endless slopes without a stick or stone. Here is joy, he thinks, until the growl of the avalanche, the frozen snarl of the lurking maw, or the cold grip and darkening wings of the coming night bring him to a sense of the hidden fears of that friendless and shelterless solitude. Not having studied the anatomy of mountains, those who know them only in their wintry garb have no eye for what is *under* the snow, whether what to them is merely a potential chute is really a slope of grass, scree, rocky slabs, *névé*, or ice. Add to this that mountaineering is popularly

known as a 'dangerous' sport, for which guides, advice, and training are necessary, and which one must approach with certain misgivings. Ski-ing is at first a mere amusement near the haunts of men which nobody suspects of other harm than a rare sprain or broken bone. But as the tyro becomes more skilful in the management of his gliding boards his spirits begin to rise, and in the same degree increases the height above sea-level to which he aspires. The longer radius of motoric action is, however, without the corresponding experience theoretic and practical, of navigating the high snows. He, so to speak, drifts into the practice of mountaineering without being conscious of it, all the more so as hill-craft in winter begins at a much lower level than in summer; or, in other words, is more dangerous owing to the shorter days, the greater cold, and the desolation of nature immediately above the villages. Thinking mainly of the slide down, the ski-runner is apt to make a shockingly bad piece of workmanship of the way up, especially as regards waste of energy by going fast, and inattention to general conditions of weather or snow. Although he knows that there is such a thing as an avalanche, I have not yet met any one who could properly judge snow, except amongst those who had been climbing before during summer and winter. One of the most serious possibilities is that of a complete break-

down of the ships on which he floats, and of literally getting stuck up waist-deep, never having walked in snow, and never having had occasion to learn the secret of power and progress which lies in the patient, plodding tread of the mountaineer. These few remarks should be enough to call to mind the greatest problem still before us: that of rendering the ski-runner efficient as a mountaineer. The best step towards this goal would be an active propaganda among the climbing fraternity, so that great numbers of them could be induced to take up ski-ing, and thus teach ski-runners by precept and example" (from the author's "Recollections" in the Alpine Ski Club Annual, No. 1, 1908).

"It is quite impossible to define exactly what constitutes mountaineering as apart from strolling and short excursions, but its chief characteristics are distance from human dwellings and human help and the presence of special dangers. The term 'mountaineering' comprises a multitude of rules which teach how to overcome the difficulties and how to avoid the dangers of rising ground. Mountaineering is a science admirably expounded in a series of classical text-books, the result of the experience of thousands of climbers, and the quintessence of a literature of over ten thousand volumes. From a subjective point of view mountaineering begins when a wanderer approaching a hill or mountain

is conscious of the fact that he will meet with special conditions which demand a special knowledge. And the minimum required of a man who wishes to be called a 'mountaineer'—a good mountain-climber, an expert,—is that as to the theory he should have 'Dent' at his fingers' ends, and as to practice must be a man who can be trusted to attempt any peak in the world without endangering the lives of his companions" (from the author's contribution to "Ski-running," p. 99).

After this dry explanation the reader will appreciate the full weight of the eloquent words penned by Alfred Wills, one of England's oldest mountaineers: "There is, indeed, throughout these pages a keynote of warning rather than encouragement. The Alps have been styled the playground of Europe, but the play-field may be the field of death if incautiously approached or ignorantly dallied with. Nature trusts her secrets to those only who hold her in awe and reverently own her mystery and reserve. To such as woo her with respectful admiration and with patient suit she tells her story freely and with ever-growing kindness. Woe betide those who think they can know her at first sight or win her confidence without sympathy or effort" (Dent, "Mountaineering").

"The part should not be mistaken for the whole. A man may be an active or even a

good climber (we read ski-runner) and yet a very poor mountaineer. Ability to run rapidly up the rigging does not qualify a man in seamanship."

"A far better criterion than a long list of peaks and passes successfully overcome, is the manner in which a reputedly easy mountain has been accomplished. The skilled mountaineer has always, as it were, a large balance in hand. It is in the avoidance of risks that his experience tells" (Dent, "Mountaineering").

Mountaineering is therefore the science of general conditions and the art of treating the mountain with respect. The necessary mental attitude and the most important technical rules can be compressed into few words, but the proper application is a problem of numerous possibilities and endless experience.

I quote a few lines of my own from "Ski-running": "The fear of the avalanche, bad weather, and breakdown (of body or ski) must always be before the ski-runner's consciousness. All the rest is a matter of well-defined dogma, of strict attention to well-known precautions, which belong to the routine of the craft."

1. Never go alone; three is the minimum. The solitary mountaineer is a fool.

2. One man at least must be an Alpine climber of experience.

3. All members of the party should be nearly equal in skill.

The stringent "rule of three" is the only efficient safeguard against the pitfalls of the glacier. Further, it offers guarantees in case of accident. If something happens to a man one can remain with him while the third goes for help (if possible).

The office of the experienced leader hardly needs explanation. He is eyes and ears for those under his care. He will see to it that they are properly equipped and generally fit for the undertaking. If he is implicitly obeyed and if he finds that his authority is accepted in the proper and cheerful spirit of good sport he will certainly not allow his task to end there. He will feel it his pleasant duty to educate his companions by imparting his knowledge and giving practical demonstrations in the field.

Graceful ski-ing is not necessary in mountaineering, but the party must be uniform. It should act as one whole, and set up its standard according to the weakest link in the chain, *i.e.*, the worst runner. Either the skilled leader reduces his sporting ambitions to the physical capacities of a party of beginners, or the party yields to the least efficient member, or they are all of them about equal. If all of them, or the leader in authority, are mountaineers, all is well. But imagine an old climber, but a tyro on ski, in a party led by an excellent runner—say a Norwegian fresh from Kristiania—who does not

know the dangers of the Alps. His voice would lack the support of physical dignity, owing to his humiliating inferiority. Evidently the leader should be a mountaineer and his ski-ing of good average quality. If the whole, or the bulk of the company, consists of Alpinists deserving of the name, they may be the worst ski-runners that ever trod the snows; it will not matter, for they will soon see how far they can get, when they must turn back, and what, in general, they can and must do. Physical endurance and skill are merely factors in the reckoning: "If I wish to reach a certain goal, what must I be able to do in order to get there safely at the right time, get back, and have a substantial balance of safety and energy in hand?" The making of this calculation is the secret of good mountaineering. The solution of the problem, "What can I do?" is obtained from external conditions, modified by personal aptitude. Insufficient knowledge of the object and an overrating of the subjective factor have produced the majority of all accidents.

I hope, then, to have made it clear that the mountaineering principles are more important than the gymnastics of the sport. To put it paradoxically, one may be a cripple and yet a mountaineer. In other words, one will not attempt what one cannot, and ought not, to do. Such, at least, is the higher and esoteric meaning of that much abused term, "mountaineer."

Viewed in this light the honoured name simply means "the wise man, in general, in his particular attitude towards the mountains."

The moral courage to turn back soon enough in the face of threatening danger is perhaps the most difficult virtue. Yet it is the most obvious, and certainly nothing can be more rational than to cut short all further anxiety by a speedy retreat. But whoever has been forced to turn back a few hundred feet below the summit knows well how the sporting instinct tends to deafen the inner voice of warning. The rule of timely retreat not only holds good of the elements of nature, but also with regard to one's own condition. If a man is too tired to face a certain difficulty he should confess the fact and not feel ashamed. He may otherwise do harm to himself and to his companions. All good mountaineers, aware of the importance of self-restraint, and of the soul struggle it entails, will refrain from belittling an expedition which has failed to reach the summit. It is better to pass severe criticism on successful climbs.

The intending ski-mountaineer must train himself to be distrustful of easy places. Difficult passages are a warning in themselves. Danger and difficulty are by no means synonymous. A difficulty is dangerous only to the incompetent or reckless. A difficult place is one in which one sees and expects hard work and risks. One

approaches it with caution and duly equipped, for danger is the unexpected or hidden, or the fury of the elements, over which we have no control. There is truth, therefore, in the paradox that the more difficult an enterprise seems to you, the remoter the chance that anything will happen. Thus most accidents are self-caused, and due to ignorance or bad guiding. To know Alpine nature, to know oneself, and to know the rules of hill-craft, are the duty of the mountaineer. Skill may occasionally counteract unexpected danger, but more often than not it will lead right into it. An increase of athletic proficiency demands, therefore, a corresponding increase of knowledge. The fastest ship must have the best captain.

Ski-running at present occupies a curious position, being a most disconcerting hybrid between gymnastics and mountaineering. As long as we look only at the physical and technical side of the definition—*i.e.*, the action of ascending and descending a hill—it may be called mountaineering. But as soon as we turn to the higher meaning we find that the term "ski-running" does not convey this meaning as a necessary part of its nature. It does not, like mountaineering, suggest to the general public the wholesome atmosphere and controlling influence of the Alpine Club. Let us beware of the use of the word "ski-running" as capable of leading the uninitiated into undertakings of which the

Dr. Clark.

To face p. 112.

CORNICE BREAKING OFF.

J. Herold.

CORNICE.

To face p. 113.

customary definition of the term does not give them due warning. The Alpine climber does not require ski, not even in winter, but ski-ing stands sorely in need of a conscious mountaineering responsibility.

The mountaineer looks upon ski-ing as adding new pleasures to his science, but also new difficulties. The ski-runner is apt to regard his sport as mountaineering made easy.

Wherever there is snow one can ski, but the question is also whether one may.

Mountaineering begins in the plains.

Planning.—Whatever the wider conception of mountaineering may be, the beginner will always ask for a practical answer to the following questions: "Where does mountaineering begin?" "When may I go on a tour?" With all due reserve I might answer: Mountaineering begins as soon as you are out of sight and out of earshot of human settlements, also when you get above the timber-line, and always when you are on a glacier, near an avalanche slope, and above precipitous rocks. Remember that these things may be quite near a high hotel and that in very bad weather or a thick mist one can be very lonely 50 yards from a house.

As to physical fitness, this can be roughly determined by a test. Climb to a place 1,200 ft. above the starting-point within an hour; turn without taking a rest and run down again. If

you get down to the start within 12 minutes, arriving in good condition, then you are fit for average day-tours. Twelve hundred vertical feet in one hour is unusually fast climbing, but the idea of this test is, of course, to show that the examinee can climb well on ski and that he can slide down in fair style *in spite of his fatigue*. The proof of the reliable ski-runner is his ability to keep going without falling, however tired he may be.

The usual rate of ascent is about 800 to 1,000 ft. an hour, but will be much longer in deep snow or on broken ground. As the descent can be accomplished very quickly, experts may reckon that going up and down an easy mountain will take the same time as in summer. Under unfavourable conditions—that is to say, on expeditions which are not ski-runs pure and simple—the man on ski is, on the whole, more handicapped than the climber on foot. Avalanche slopes, bad snow, mist, night, unknown ground, cause more anxiety to the ski-runner than to the climber, especially when these unforeseen difficulties are encountered in the descent. Very often one has the evenly balanced choice of two evils: that of taking off one's ski and that of keeping them on.

As most ski-runners have smooth-soled boots leaders should remember that and not plan tours involving much climbing on foot. If *short* bits of

rock-work are expected—such as knobs on a ridge—a rope must be taken. What with slippery boots and the heavy ski on his shoulder, the ski-runner is a poor climber at his best.

"Too much care cannot be bestowed on picking your comrades." This advice given by Claude Wilson ("Mountaineering," p. 26) says everything.

When planning an expedition try to obtain full information from maps, guide-books, natives, and friends. You ought to know as much as possible about times and distances, the nature of the ground, landmarks &c., even if the course happens to be marked with flags. If unable by these means to get a clear idea, it is better to spend a day in preliminary reconnoitring. This is best done by climbing a neighbouring height in order to get a good view of the mountain. Scan its sides carefully, paying special attention to such features as speak *against* the choice of a certain route. Without such careful preparation you may easily come to a dead-lock somewhere, or lose much time. Daylight on the mountains is a valuable asset of life, especially in winter. If, after this general survey, there is time to explore the lower approaches, so much the better. The paths leading from the village and through the thick forest to the upper slopes often form an intricate system, complicated by gullies and rivers without bridges. Make sure what "right" and "left" mean in any directions you may receive—

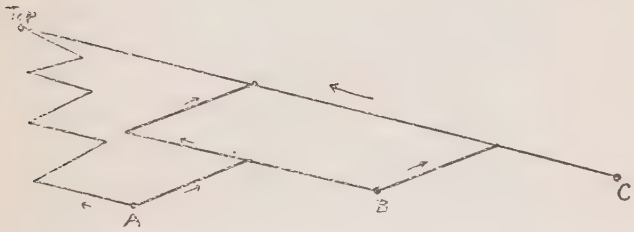
i.e., looking at the mountain or looking down the slope, river, path, or valley.

For the descent the ski-runner will, of course, avoid paths as much as possible. They are about the worst ski-ground in existence, except when not steep and covered with deep snow. But here the "cussedness" of things is seen at its worst. Just where we want a nice gentle path with soft snow—that is to say, where the absence of open slopes obliges us to pass through forest—the peasant requires steep, winding paths for bringing down his pine trunks. He is busy at this throughout the winter and polishes the so-called roads into glittering chutes down which the unfortunate "plank-hopper" is shot like a cannon-ball.

Owing to another unkindness of nature and intimately connected with the one just mentioned, the southern slopes of the mountains (where the snow so often is bad) are the best as regards the formation of the ground and the absence of woods. Here the long slopes rise gradually to the mountain-tops, and cereals and grass grow well in the sunshine, whereas the shady side is either steep or wooded, or both. Thus the sun is ultimately responsible for much that spoils our ski-ing in winter. It has retarded denudation on the wrong side where it makes the snow sticky or crusted, and it is indirectly to blame for the bad paths. We must admit,

however, that it atones in March and April for its sins in January and February. During late winter and early spring ski-ing on southern slopes is an unmixed joy.

In sketching out a line of ascent the inexperienced are generally attracted by the *shortest* slope between their goal and the starting-point. But on the mountains "short cuts" are rarely of advantage to the climber (unless expressly used to avoid dangers on the easier way), and



to the ski-runner this fundamental law applies with double force. Assuming that he obeys the rule of even gradient intelligently, his ski-tracks to the same vertical height will always be of equal length.

Although the most direct slope is between A and the top, all the ski-routes from A B and C to the summit are equally long. But the way from C is the best (snow and obstacles being the same), because walking on the steeper slope is more fatiguing owing to the greater

difficulty of stamping the track, also because more kick-turns have to be made.

Outfit.—For useful, all-round work short, strong ski are the best.

Never be tempted by fine weather to leave your warm clothes at home. Climb as lightly clad as you like, but have a spare waistcoat, wind-jacket, &c., in your rucksack. They will be a comfort on the top, a blessing in a wind however slight, and may decide the question of life or death in a blizzard or during a night spent in the open.

I insist again that spare gloves must be taken and that snow-goggles can never be put on too soon. Avoid taking off your gloves in a high wind—it is surprising how quickly one's hands will get numbed.

Get your things ready the night before; see that everything is in order and fits properly. Accomplished tourists wax their ski until they are like polished glass and fix the sealskin for the morrow's climb.

Do not rely upon others for taking this or that. The leader or guide is responsible for articles of common outfit, such as medicines, bandages, lantern, rope, spare tip, &c., but the others should take an interest in these things and remind him about them.

Food and Health.—In these days of anti-alcoholism and hygienic education, I need not

go into detail. Everybody knows, or ought to know, what agrees best with him, and that strong drinks lower the temperature as well as the muscular efficiency of the body. Brandy is only to be taken as a medicine. Try, however, not to feel ill too often.

Fats (sardines, butter, raw bacon) and sugar are the most important foods. They are rapidly absorbed and act like a charm when one is tired. Do not put off eating too long.

To take a short rest and some food at least every three hours is the average rule. If it happens to be very cold and windy eat something while walking on slowly.

The question of provisions is mainly one of transport, and it is therefore advisable not to carry things which contain much water such as fresh or tinned fruit. The foods which have stood the test of time are: bread or biscuits, butter, sugar, lemon-drops, cheese, sardines, marmalade, bacon, dried fruit. Cold tea or coffee and lemon-squash are the best drinks. Do not take too little. When well sweetened a drink is also food and a rapid pick-me-up.

Put on warm things at once when sitting down or when coming into shade or wind. It is ten times more rational to retain the warmth which you have than to restore it after you have been thoroughly chilled.

Frost-bite on the feet is avoided by roomy boots, thick socks, and a good binding.

Climbing.—"The great object, of course, is to ascend with as little exertion as possible, and in even so simple a matter as walking uphill, there is so much that may be acquired that a man may go on improving for years.

". . . a quiet swing and a methodical rhythm of gait. A certain slight degree of roll, or to put it more scientifically, of swinging of the pelvis or hips, is of the first importance" (Dent, "Mountaineering").

The ski-runner ought to know even better than the pedestrian what this means. Raise the back leg slightly and let it swing forward like a pendulum, finishing up by a lunge to which the weight of the body supplies the motive force. Do not lift the body and spring forward by raising yourself on the toes of the back foot. The habit of walking properly on ski is best cultivated by climbing without the help of sealskin, as then there is no temptation to "push off" with the other leg.

Use all your ingenuity and skill to avoid lifting the ski from the ground. This is facilitated by a clever disposal of the track. Look well at your slope and imagine that you are an engineer about to construct a good mountain road of even gradient. "In walking uphill the zigzag system cannot be too generally adopted"

(Dent), which means that a few more "tacks" are better than side-stepping or a steep track with much slipping back and muscular strain. Lazy people take most pains, and the "short cut" is the refuge of mental laziness due to impatience and inexperience.

"It is almost impossible to judge of the inclination of one's track by the eye. One learns to maintain it by a feeling in the foot and by an automatic regularity in the pushing forward of the ski" (Zdarsky). One learns to use one's planks as a road-making instrument or level indicator, at the same time allowing for the amount of compression of the fresh snow at every step.

"Regularity of pace is of prime importance and the rhythm of the footfall is of more consequence than the length of the step. It is better to lose a few inches in the stride than to interrupt the rhythm. The duty of the leader is to set the stroke best suited to those behind him and he must steadily keep to that pace" (Dent).

If greater speed is necessary or possible one must endeavour to obtain it by a lengthening of the step and powerful "stick-work," but not by quickening the stroke, which should remain the same.

Above all, let the pace be slow at the beginning of a tour, which is another reason

for insisting upon an early start. It is better to sleep an hour less and practically creep uphill at first. Neither body nor mind are at their best in the grey morning and resent any immediate effort. Allow plenty of time to the human machine to settle down to its work and it will do wonders. Do not put on the "fourth speed" at once.

Occasional little slips of the foot are naturally more frequent in the case of the ski-runner than in that of the mountaineer. If they are plentiful the track is too steep and must be altered. But if a slip is accidental the expert "accepts" it, that is to say—he does not try to check it by a sudden effort. He does not "struggle," but lets it be and then goes placidly on without breaking the evenness of his pace.

I here repeat the warning as to sealskins. A raw beginner who cannot yet climb properly is often tempted to visit a high peak by their (deceptive) aid. Without them he would have turned back long ago, but as it is, he just manages to reach the summit, only to descend in a series of falls and taking from two to three hours where the average runner in good training takes about half an hour. By far the most agreeable expedient in such a case, certainly less distressing to the sufferer and spectators alike, would be to turn the skins round "against the rub" and *walk* downhill on ski.

On the other hand, detachable sealskin is the most valuable means of going fast and saving much bother over track-planning when employed by the tested and *bonâ-fide* tourist. If he can climb 3,000 to 4,000 ft. with ordinary smooth ski (neither slippery nor waxed, neither sticky nor iced) and run down well even if tired (which he should *not* be), then he may begin to use artificial or makeshift preventives against slipping back. They will enable him to get over icy paths rapidly and to make a steeper track.

The beginner will avoid paths in the ascent, but the expert who thinks only of the "run" often prefers them as the shortest means of access. Up these he will either carry his ski or slide up with skins under them. The last way is certainly the best when one has no nails in one's boots and when the path is not too steep and the snow in the right condition. If the path is very steep or covered with much hard water-ice then one must walk. Beginners usually groan under the weight of the ski, but old hands think nothing of having to carry them for two hours.

Of course, when a ski-runner has the choice between a path however good and an easy slope he will always prefer the latter.

If you intend coming down the same side, study the ground during the ascent, picking

out an imaginary spoor for the run down. It is very good practice and you will be surprised to find out how many choice bits or convenient gaps you will miss and how quickly you will have passed certain landmarks, almost before you knew that they were near.

Tie your ski together when carrying them over a "portage," such as a difficult place on a ridge. This will prevent them from careering down the snow-slopes in case you should accidentally drop them.

The Run.—Remember everything that has been said on the subject of tackling the ground. Keep your eyes open, look ahead and think ahead, considering the best means of getting over the ground with the least effort, in the best style, and in perfect safety. Think of possible dangers and obstructions before thinking of your pleasure or the shortest way down. Be prepared for changes in the slope, the snow, sun, wind, and the possible sudden appearance of obstacles. While strictly following the general direction of the leader's spoor, tackle the ground scientifically in the way best suited to your own powers. Do not rush headlong after some one in front. It is more satisfactory and generally quicker to tack twice and make a kick-turn than to dash, fall, and get up again.

When it is dark or misty run down in short curves. This is the best way to explore a slope

as one goes along. Run in one direction as far as you may safely go, slow down, and examine the ground below you, make a curve there and continue in the opposite direction. When in a hurry, for some serious reason, do not dart on steep ground, but make a very steep stemming track. This, combined with curves, is a safe and easy method for overcoming narrow clearings in the forest and similar places. In a gully or on very rapid slopes full of rocks or trees the side-slip will prove a friend in need. Do not despise it on account of its ugliness.

"Pluck is an important factor in a dashing run, but to undertake anything beyond your powers or experience is mere foolhardiness. Most accidents are due not to ski-running but to the ski-runner. On the high mountains is neither the time nor the place to try experiments or show pretty tricks" (Hoek).

The expert who is sure of himself may, while on tour, take certain liberties with "style" which he would not allow himself on the practice field. He will occasionally stand back on his stick a little or let his ski go apart on bad snow in order to avoid falls. Venial sins of style are permissible to those who have judgment, and as long as they do not produce a greater evil (strain, waste of energy, fatigue) than the one it is sought to avoid (falls in wet snow).

Avoid coming too close to rocks and trees,

even when you know that you are able to brush past them. Near rocks there are often hollows under the snow, or ice; near the trees are roots and long branches. When obliged to pass a narrow place or gap always slow down; again, do not hold your stick cross-wise, but well behind, or it may catch and give you a nasty knock.

When the snow happens to be pasty or sticky, accumulating in front, place your ski apart (broad parallel spoor) so that it can flow off. Dip down the slopes as straight as possible and lean back a little on the stick, for this kind of snow is very apt to pitch one forward. If an incline is exceedingly gentle but the snow good, one may be able to keep going by placing the ski level (points equal) and distributing the weight on both. This gives a greater floating surface, whereas in the normal darting position one is practically running on one ski only.

If obliged to use a steep and narrow path stem with one ski on the wall of snow which generally accumulates at the side. On icy paths take off your ski.

Mountain Rules.—Make sure of the time and place of meeting.

Never trust to luck in the matter of finding food or drink somewhere.

Be punctual and start early. Leave all mountain huts clean and in good order. Avoid lighting

a fire in châlets, but if you do extinguish it carefully with snow before leaving.

The last words to be said before a start, whether at the beginning of an expedition or after a halt, should always be, "Has anything been forgotten?" Read off the list of outfit.

Always say where you are going, and leave a written notice in club huts, &c.

Remember that the party is as fast and efficient as the slowest man. During the ascent the members of the party should "track" in turn. The first man steps aside and lets all the others pass him, thus joining on at the end.

Keep together. When leaving the summit let the leader go on ahead, giving him a good start. Do not outrun him and make misleading tracks.

The leader should assemble the party from time to time and count them. The oftener he reminds them to be careful of breaking their bones or their ski the better. A good and patient runner must bring up the rear with the worst runner, so that there are always two left behind at the last.

On big tours avoid falls—not because a fall is shameful in itself, but for the sake of the mountaineering principle. A fall may at any time be the cause of an accident. Even if it is only a broken ski the result is not pleasant, especially to one's companions. It is no joke waiting in a cold

blast till the ski is mended or carrying down a disabled man. Think of your comrades, if you do not think of yourself.

Dangers.—Amongst the dangers of the mountains are those of falls down rocks or ice-slopes or into crevasses, breaking through a cornice, bad weather, darkness, and avalanches. Of the glacier and of avalanches, the most hidden danger of all, I speak separately. All the others are obvious enough. One can only repeat: "Knowledge! Caution! Self-restraint!"

Turn back before it is too late, before the blizzard numbs you or night obliges you to expose yourself to bitter cold. But once you have been caught or have lost your way, do not lose your head, but think out what you should do. Try to reach the valley or the forest. The more precarious your position, the harder you must think, the less you must hurry. But keep it up, slowly but surely.

"I do not think it possible for any one who has not felt it to have any idea what very bad weather means in high places, even in places by no means the highest, or to imagine the rapidity with which, under unsettled atmospheric conditions, the destructive forces of nature can be raised and the worst assaults of the elements delivered" (A. Wills, in "Mountaineering"). In a mist a compass is only of use for telling where you are, if constantly referred to in con-

Dr. Clark.

DANGEROUS GROUND.

Facing p. 128.

W. R. Rickmers.

ON A GLACIER.

This was in the early days of Ski-ing when the use of the rope was considered impossible.

To face p. 129.

junction with the map. Otherwise it can only render you valuable service by keeping you straight. Never allow a single man to leave the party for the purpose of reconnoitring. The safest plan is to put on the rope at once, wherever you may be, when overtaken by very thick weather or black night. Keep moving if the ground allows it, but if obliged to camp, strain every nerve to obtain shelter from the wind. Dig a deep hole in the snow and crowd into it. Keep each other awake and make all sorts of exercises to do so and to keep your feet warm. Avoid alcohol like poison.

Fatigue is a danger, because it makes a man weak and, what is worse, careless. If any one is very tired, feed him frequently.

Never leave a disabled companion alone. If he has broken something, bandage him with some splints (branches, ski-sticks, puttees) and tie him on to a pair of ski, or better still, to two or three pairs lashed together. Should he have to wait until help is fetched, leave him plenty of extra clothes, so as to keep him warm.

When you are in difficulties and there is a chance of your being heard or seen, use the regulation international signal of distress (see Appendix).

Always expect danger. When in doubt choose the safe side.

Glaciers.—It is sufficient to tell a beginner

that a glacier is a snowy place with terrible chasms partly hidden from view by treacherous snow-bridges. To avoid disappearing into a crevasse for ever one uses the rope. There should be at least 15 (better 20) ft. between every two members of the party. The best number for a ski party on a glacier is four on one rope. Keep your eye constantly on the man in front of you and expect a pull at any moment. The injunction to hold the rope taut and to be ready for every emergency applies with tenfold force to ski-runners owing to their precarious footing. Put the rope on *at once* when touching a glacier, and never take it off *too soon.* The secret of the proper use of the rope is to check the fall when a man breaks into a concealed crevasse. To get him out again when once he has fallen far, even if only 8 or 10 ft., is a task more difficult than most imagine.

The nature of glaciers and the details of the scientific application of the rope are best learned during summer climbs with experienced guides or amateurs, coupled with a study of the best books on the subject.

What I must insist upon here above all, and with a loud voice of warning, is the absolute necessity of the rule of three (minimum) and the use of the rope. I must also rigorously denounce the fallacy that glaciers are safer in

winter than in summer. *They are not!* There may be many more safe bridges, but enough bad ones are left, and these are more skilfully disguised by fresh snow. We do not calculate chances on a glacier; we take none.

Avalanches.—Of all subjects connected with mountain dangers, this is the most difficult, and only recently authors such as Paulcke, Ficker, Hoek (see "Literature") have thrown a clearer light upon this complicated problem. Paulcke was the first to rearrange and correct old facts and to add new ones. I base my remarks on the elements of his classification and nomenclature.

An avalanche is a snow-slide, and as such a very simple affair—as simple as a breeze or a tornado. The difficulty is to know when it is imminent or whether it is due at all. The science of snow is solidified meteorology, diagnosis and prognosis being made a little easier by the substitution of a more stable element than air to serve as the basis of calculation. But only a little!

The complexity of the problem is enough to drive the expert to distraction and almost makes him wish back the blissful ignorance of the beginner. Some, indeed, drift into a state of reckless indifference and trust to luck as being in this case just as reliable as analysis. This uncertainty endows the avalanche—the latent or

lurking condition—with its special character as a bugbear, as an irritating worry. Often one turns back, only to say to oneself afterwards, "Perhaps the slope was quite safe"; and nearly as often, after crossing a slope, one doubts if one ought to have done so. It is true that what may be called the preparatory conditions of an avalanche —the formation of the ground, the state of the snow, &c.—are visible to the eye, but there is no opportunity of watching its approach, as in the case of a storm. There is no "notice to quit." Movement and sound are not warnings in advance; they are the rush and bellowings of sudden attack. Bad weather, however treacherous and unexpected, will give you at least a few minutes in which to think and get ready for action; also you can face it, fight it, or wait. The ponderous monster of the heights in his playful moments may give you three seconds in which to make a hopeless position a little less hopeless.

When a quantity of snow has become too heavy for a certain slope, it slides off. But weight alone means nothing. The "starting weight" depends upon—

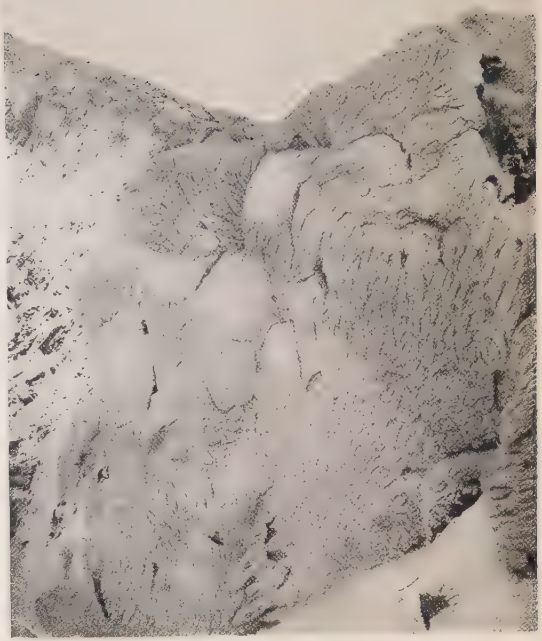
1. The interior condition or friction of the snow.

2. The friction against the surface on which it lies.

These two conditions are determined by the

R. Schloss.

CORNICE AND AVALANCHE SLOPE.



Dr. Clark.

ICE-FLOWERS.

[See p. 43].

G. Gassler.

action and the changes of weather (temperature, wind, sun) on the snow, old and new.

3. The inclination of the slope.

4. The shape of the slope (convex, concave, support at bottom, &c.).

5. Any sudden changes or disturbances (walk of the ski-runner, change of temperature, falls of snow, cornices, rocks from above, &c.).

A hundredweight of snow will leave its resting-place much sooner if it is watery than if it is sticky or consistent. Every one devoted to a gliding sport knows that the harder and steeper a gliding surface the more readily a thing runs down it. All the first three factors can easily be studied on the practice-field in the course of a winter with its many changes of snow and temperature. On big open slopes the curve of the ground can be very important. A convex slope, which bulges outward, may, under certain conditions, be compared to a bladder on the point of bursting. On a concave slope the layer of snow is, so to speak, built up as an inverted vault which supports itself. Whoever has much experience of piling up books very high against a wall can appreciate these laws of statics.

These factors with their endless possibilities of combination determine whether a given quantity of snow will remain where it is or slip down. Clearly, the great difficulty consists in knowing how far it is from the critical point, for

once the mass is on the move the theoretical question becomes of secondary interest for practical purposes. What we wish to find out is how near a slope at rest is to the breaking strain, or if, perhaps, the breaking strain has been reached but is held in suspense by tension. In the former case the snow is in perfect equilibrium and will not move unless a sufficient additional *weight* is placed on it, or (which comes to the same) a strong impetus from above is given to it. In the second instance the slope is in a state of unstable equilibrium and only a very slight *disturbance* is needed to explode the waiting charge. Obviously this fine distinction matters little when we walk *on* a bad slope, for it is only of academic interest to know whether our additional weight or the disturbance which we caused was to blame. But its importance is evident when we approach a place from *below*. For although we must put our *weight* on the *top* of a slope, we can *disturb* it at its *foot*.

The more one studies the subject the more difficult it becomes, and all detailed description can only show the beginner the impossibility of calculating chances to a nicety. We must leave a very wide margin and take doubt as an order to retreat. On high tours the tyro must be accompanied by guides or good amateurs. The expert's experience should extend far beyond the outlines traced in this chapter, which is only

intended to guide the first observations of the beginner.

As a fundamental classification that into "wet" and "dry" avalanches recommends itself by its simplicity. A wet or sloppy condition of the snow is soon recognised by the most casual observer as a cause of accumulating slides. But this state is so obvious and the wet avalanche occurs so rarely in the higher regions during winter that we may dismiss it in a few words. Enormous and destructive wet avalanches only take place in the spring when the mountain's white cloak has been warmed and soaked right down to the ground. With these "ground avalanches," as they are called by the Alpine peasant, the ski-runner in April soon becomes acquainted through frequent warnings. They are, on the whole, restricted to well-known tracks, and the natives have a very fine instinct for predicting their coming. All one has to do is to avoid huge slopes, narrow valleys, gullies, &c., during the critical time. In January and February the wet avalanche usually occurs when after a moderate fall of new snow the sun beats strongly upon steep slopes. Then a slithery skin peels off the underlying surface of older snow and hisses down in quickly gathering masses. Such avalanches (as shown in IX.) hardly ever grow to considerable size. But I may here say at once that the tourist should

not take size into account at all. It does not make much difference whether you are hit on the head by a 12-in. shell or by a rifle bullet, and both may miss you equally well or let you escape by the skin of your teeth. The dead weight of even the smallest snow-slide is so enormous in comparison to man that the difference in weight between avalanches 5 ft. wide and half a mile across need not trouble us. Remember that a cubic yard of snow weighs half a ton or more according to its condition, and that 10 in. of snow on both ski may weigh as much as 100 lbs. The smallest avalanche may break one's ski, or pin one against a tree, or even suffocate the runner if he happens to be alone and speedy help is not forthcoming. On the higher mountains it may carry him along tenderly and then precipitate him into a crevasse or over a rock-wall, although in itself it was too small to do any harm by rough handling or burial.

The classification into ground and surface avalanches frequently met with in treatises is valuable in so far as it reminds us that the skidding plane may either be the mountain itself (grass, smooth rocks) or a stratum of older and harder snow.

By far the noisiest and most destructive kind of all is the "wind avalanche." In order that it may be formed, dry snow must be precipitated over very steep ground. Powdery snow—*i.e.*,

very dry cold snow—has a strong internal friction on account of the sharp edges of the tiny hard crystals. Every one knows this who has tried to shove powdery snow down a slope in order to start an avalanche. I, at least, have never succeeded, even when the snow was fairly deep and the slope hard and steep at the same time. Owing to this friction a powerful first impact is necessary to start a wind avalanche on a big open slope. The first impetus is either given by the wind during bad weather, or by snow slipping from rock-slabs when the morning sun strikes the mountain-tops. Or, it may be, a cornice breaks off, or a boulder becomes detached. This first fall easily collects the snow-patches clinging to the slanting eaves of the rocky wall, and thus continues its career, growing larger and larger. Finally, at the bottom of the precipice, it rushes down upon the great slope, sweeping it clear and forming a huge avalanche. The internal friction of the snow crystals explains why the apparently ethereal cloud is sufficiently solid to chase the air in front and whip it up into a furious hurricane, which comes roaring down the mountain, cutting lanes into the thickest forest, even before the mass of running snow has reached it. The possibility of wind avalanches adds but another terror to bad weather, serious enough in itself on the mountains at all times, and especially in winter. A blizzard of half an hour's duration may convert

into a death-trap a valley which was harmless when the party entered it. The great quantity of fresh cold snow rapidly falling during a storm and the force of the blast have caused nearly all the wind avalanches which have threatened or killed winter mountaineers. On a clear day, when one sees where one goes, nobody in his senses will venture near snow-laden precipices. But it must be borne in mind that the influence of this demon of the air is far reaching, and will often extend to the opposite side of the valley. As in the case of the ground avalanche, however, the most dangerous localities are familiar to the mountain folk. Very long slopes, often crowned with rocks and debouching upon avenues or gullies cut through the forest belt, are the favourite lairs alike of the ground and the wind avalanche, the two most gigantic types of wet and dry snow-slides. Like Vesuvius, they sometimes destroy fields, forests, and villages ; like him they threaten from above; like him the natives accept a menace which to the stranger is too obvious to be borne with equanimity.

The most dangerous kind of avalanche, and the one responsible for the majority of accidents to ski-runners, is the one which the tourist starts himself. It is usually of small or medium size, may be fifteen tons, may be ten thousand or fifty thousand, whereas a really large one brings down several hundred thousand or a million tons

H. Hoek

A Typical Snow-slab.

Weidling.

The Birth of the Wind-avalanche.

face p 138

R. Schloss.

SNOW-SLAB.

To face p. 139.

of snow. It goes without saying that the avalanche which the ski-runner snaps by his touch is, so to speak, the one which is lying specially in wait for him like a tiger on the spring. He is but accidentally overwhelmed by those which happen to cross his path under certain condition of weather.

The typical tourist trap is a dry avalanche formed by a layer of new and sometimes of old snow resting on harder snow to which it is insufficiently bound. Let us suppose that there has been a spell of fine weather, which gives a firm surface to all the steeper slopes on which avalanches can occur, say from 25° upwards. The snow has settled to a consistent mass, like compressed flour, on the shady sides and to sticky snow which freezes hard as stone at night on the sunny slopes. On this there fall 2 ft. of fresh snow, and a new process of settling down begins. From slanting rocks or very steep slopes the new layer slides off during the first day or two by its own weight or helped on by the action of the sun. What remains gradually grows more compact and becomes attached to the older snow. In the lower regions and during still weather this union may have been accomplished in three or four days from the fall. But above the tree-line it may be indefinitely retarded by cold and wind. As long as the two strata are not bound together the upper one may slip off when some of the con-

ditions mentioned at the beginning of this chapter are fulfilled. Such a slope may be—and is oftener than one imagines—very near the breaking strain or even in a state of unstable equilibrium. Nobody is more likely to upset it than the ski-runner with his unwieldy scoops. The white field cracks without warning, and slides down in the shape of a thick cake, exposing the surface of old snow. The material of this dry avalanche is not of the kind usually associated with danger. It is neither powdery, nor wet, nor pasty, but either like dense flour or quite hard, either good for ski-ing or inspiring confidence by the apparent solidity of the floor. In the latter case it is called a snow-slab. These snow-slabs are generally found on steep lee-sides where great quantities have been drifted by the wind. Their surface is hard, rough, and wind-marked. The worst of the snow-slab is that it may consist of very old snow, so that the time which has elapsed since the last fall is no criterion of safety. Thus there is practically no period, and no day wholly free from some form of avalanche. There is such a thing as general safe conditions, but there is never a total absence of dangerous local conditions. These special conditions in particular spots are self-acting traps set all over the mountains to catch the unwary. They are skilfully disguised, and often tempt us in the shape of easy approaches to our goal. Age of snow and a long

spell of fine weather may reduce their number, all the while making more insidious those which remain. The snow-slab is always there.

After all that I have said so far the reader will understand that it is almost impossible to give definite instructions covering all possible cases. If I tell him that a slope under 25° is generally safe he will neither buy a clinometer nor, if he did, would he take the trouble to measure many slopes during his outings. And he may, while walking on a safe slope, forget that there is a highly dangerous one above him. For those who wish to couple the indispensable observation of Nature with a deeper theoretical insight I intend writing a small volume exclusively devoted to the subject of avalanches.

A few hints must suffice here, and even they may be misleading unless constant watchfulness be the ski-runner's companion on the mountains.

Mistrust all steep slopes at all times, but more especially when they are long, even, and unobstructed. Never cross under rocks full of new snow or a slope which ends in a precipice. Do not venture on long slopes and into gullies, deep valleys, and corries, during a snowstorm, during the first few days after a fresh fall or in very hot, "muggy" weather (warm nights). When you feel and hear the snow settle under you on a gentle slope it is a sure sign that it is in a state of suspense and that avalanches are a dead

certainty in steeper places. Hard, wind-blown snow under the lee-side of ridges (especially when they are nearly free from snow to windward) are practically always slabs and liable to "snap." The snow-slab is the typical "fine-weather avalanche" and therefore doubly treacherous. Its patchy, partly silky, partly granulated, or rippled and furrowed surface betrays its origin. On the other hand, one need not fear the regular, smooth floor hard as stone, due to the freezing of soft snow on a southern face after the sun has left it.

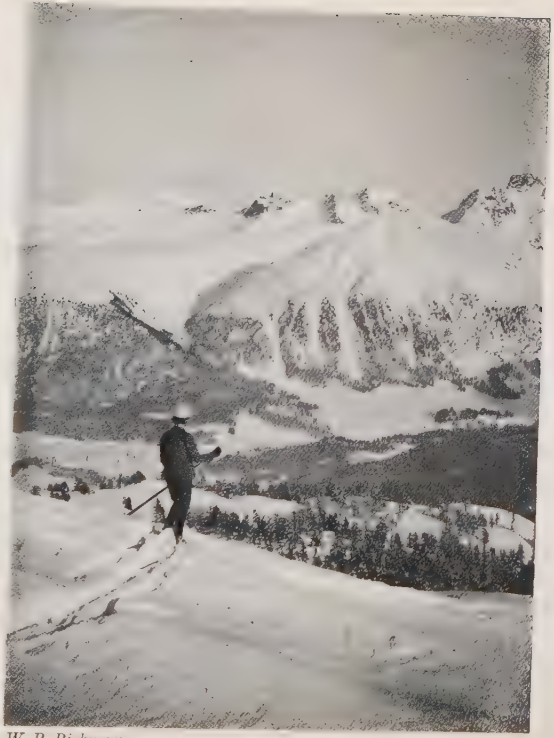
When wishing to ascertain whether a certain place is unsafe investigate by probing (if possible!), and ask yourself the following questions: What is underneath the snow on the ground, and is the snow in such a state that it can cling to the mountain surface (frozen to it or held by blocks, &c.)? Does the snow form a solid mass, or has it distinct separate layers, say soft snow on hard, or hard layers separated by a soft streak (which acts as a lubricant)? What is above and below this slope? Does anything threaten from above? Are there supports in the slope or below it? Are there tracks or remains of former avalanches? How were weather and temperature during the last few days and how are they to-day? When was the last fall? Is this a snow-slab accumulated by wind, &c., &c.? Look ahead at the places which you approach or where your projected

I.

R. Biehler.

II.

AVALANCHES.



W. R. Rickmers.

III.

W. R. Rickmers.

IV.

route lies and judge them from afar, as some of them will not bear close inspection. Touch a nicely balanced stratum at the bottom end (you may be moving on the flat) and it will rush at you with lightning speed.

As perfectly safe in themselves one may consider all slopes evenly dotted with trees, rocks, or brown patches, and, of course, all gentle, open slopes. But "gentle" is a relative conception, and its meaning in avalanche craft subject to many restrictions.

"Though it is comparatively easy to tell when it is certainly safe or obviously dangerous, the highest degree of technical knowledge is needed to say whether *doubtful* snow is really safe enough to venture on or not, and none but the very best guides approach to infallibility in this respect" (Wilson, "Mountaineering").

Whenever in doubt either retreat or try to circumvent the suspected slope by a safe route. All so-called precautions, such as keeping wide intervals between the members of the party or taking off one's ski and walking, should only be additional safeguards on a slope which one looks upon as reasonably safe from the outset. Nor should the avalanche-drag be an excuse for risking anything. Speculation as to the probable size of the avalanche or the place where you may land are equally futile. Neither the thought of these precautions nor the hope of escape owing

to a favourable formation of the ground (*i.e.*, a gently sloping outrun instead of a ditch, a gully, or a precipice) can induce a true mountaineer to set foot on a slope which he does not trust. Of course, these possible reductions of danger may be valuable aids to the choice of the lesser evil when one must retreat from cold and starvation or when help has to be brought to some one in distress.

How to gain a summit by all the means at one's command or suggested by one's experience (taking off ski and walking straight up a doubtful place, circumvention by a rock-climb, &c.) really belongs to mountaineering in its wider scope. The subject is too vast for a book which is to guide the ski-runner as far as he can and dare go with the blades on his feet.

The only proper attitude towards the avalanche in all its forms is to take it for granted that one is absolutely at its mercy. Let the sleeping dragon lie; do not pat it on the back. Its slumber can be of the lightest and its paw come down before you know that it is awake. But once it has begun to shift its bulk throw yourself on your back, ski high in air, try to keep on top by lifting out your shoulders, and trust to luck.

Explanation of Pictures.—I. Shows in a very striking manner a birthplace of wind avalanches slipping from the inclined rocks.

II. Avalanches started by the falling of a

J. Herold.

V.

J. Herold.

VI.

AVALANCHES.

To face p. 144.

F. Herold

VII.

F. Herold.

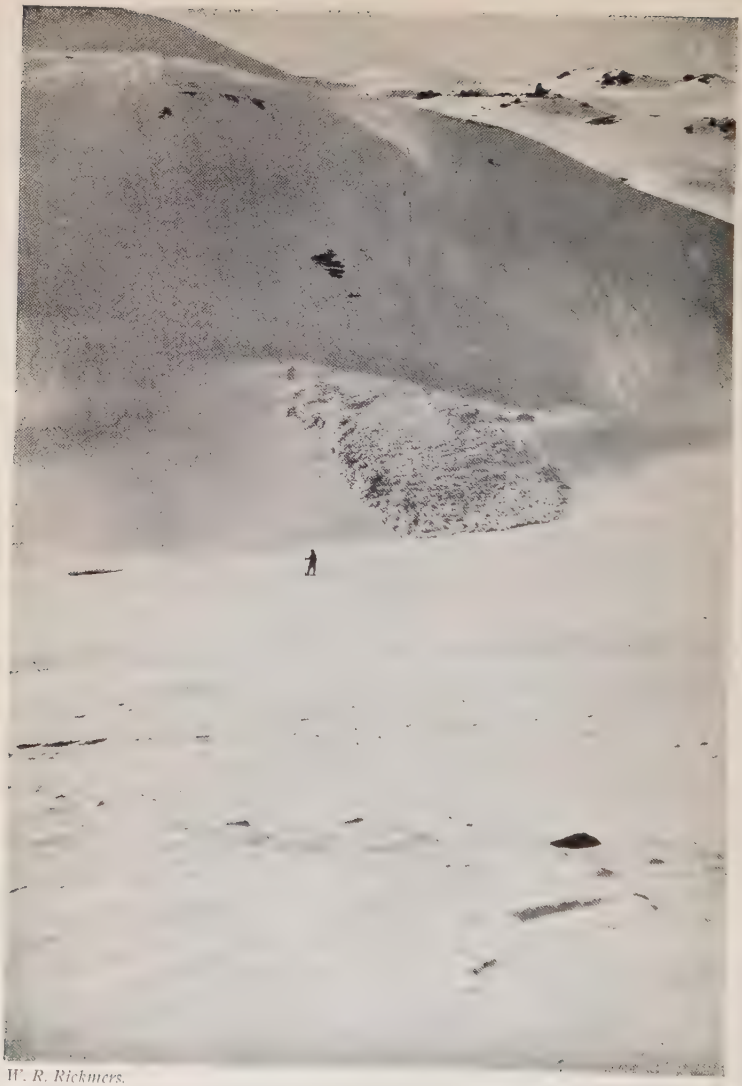
VIII.

AVALANCHES.

W. R. Rickmers.

IX.

AVALANCHES.



W. R. Rickmers.

X.

AVALANCHES.

To face p. 145.

cornice. The huge blocks (notice the tiny figure of a man standing near) are the fragments of the cornice.

III. and IV. Show the regular tracks of avalanches through the forest zone. Above the tree-line one sees the well-defined steep gullies or troughs which in IV. can be traced right from the rocks.

V. No ski-runner should dream of crossing a slope like this one. But on the other side, where the trees are, the ground is safe and easy. The ridge is carved by wind and in the foreground is a cornice.

VI. The slopes on the right, especially under the rocks, cannot be trusted. It is easy to see here how the snow, by filling up the steps and hollows of uneven ground, produces a certain even "sweep" through the most broken surfaces.

VII. A corniced gable. Its face is furrowed with deep grooves and remains of avalanches are seen below. No more dangerous locality can well be imagined.

VIII. I should not care to cross under the streaky slope on the left (where the long shadows of the trees are seen). It looks like a layer in suspense. Lower down (in the middle of the lower half of the picture) the trough-like valley is perfectly safe and far enough removed from the suspected site. On the extreme left is the top of

the ridge. One sees well the convex bulge of the suspicious slope as it curves down from the ridge, and the rocky, slippery nature of the ground beneath.

IX. Typical wet avalanches; very characteristic. New snow the day after the fall in a strong sun. The sliding layer is only about 8 in. deep, but in parts the thin layer of older snow (we are at the very beginning of winter) has been torn off from the dark patches of grass showing underneath.

X. An avalanche snout or tongue. This was a snow-slab which broke from the short slope above. It is a "small" one, but large enough to cause serious hurt or even to bury a man. In the foreground one may observe the peculiar wind-beaten surface generally associated with a "slabby" condition.

Hints and Dodges.—When your ski slip back in warm weather they are excessively waxed and must be scraped with a knife or some steel shavings. Beginners nearly always suffer from the complaint in cold, powdery snow, and this fact provides us at the same time with the best makeshift preventive against backsliding when we have no sealskins. This is "icing." Small deposits of ice or frozen snow under the bottom of the ski convert it into a file which grips on anything. Either throw a little water on the ski or hold a burning paper under it. Then im-

mediately stand on it quietly in untrodden, cold snow (in the shade). After having waited about a minute without moving, the desired effect will be felt. One can also tie knotted string or fir-boughs under one's planks, but I have never fancied these expedients very much. The knots do not always grip sufficiently and the fir branches easily drop off.

A large piece of newspaper in one's rucksack is very useful. Light it for icing ski, for thawing frozen parts of a binding, for warming cold (not frost-bitten) hands, for making a fire in a hut, for signalling at night. On snow or rocks it makes a good, warm seat, and worn under the jacket it is a most efficient protector of the back or chest.

Take a rucksack containing spare gloves, straps, jersey, to the practice-ground every day; thus you begin to live with this, the tourist's inseparable companion.

A good way of carrying one's gloves while not in use is to pass a big, strong safety pin through the tips and fasten them to the breast of the coat. On tour it often happens that one is continually taking them off and putting them on again as one passes from the sun into the shade. They are generally too large to go well into the pocket, and if tucked away negligently they are sure to be lost sooner or later.

If you have neither string nor spare straps

for tying up a broken binding use your braces, handkerchief, puttees, or necktie.

Etiquette (quoted from "Ski-running") :—

"Introductions are very informal on the snow.

"If you contemplate joining a touring party, you should ask somebody who is going, and who has already made a tour with you, whether you are likely to be welcome. If he hesitates, don't go. If he assents, go by all means, even though you may be doubtful whether you are up to the work in hand.

"You should not instantly rush to the assistance of a lady who may have fallen. Do not let your gallantry get the better of your common sense.

"In Norway ladies put on their own ski, and manage their own bindings, and it is not good manners to offer to assist them.

"You should pay up punctually and without demur to the man who finances a touring party ; it is at least ten to one that he is out of pocket, anyway.

"It is a gross breach of manners to tread on the back of another man's ski. You should at once apologise and fall back five yards" (Richardson).

W. R. Rickmers.

THE LADIES.

To face p. 148.

H. Hock.

H. Hock.

LADIES IN KNICKERS.

LADIES ON SKI

By C. Mabel Rickmers

Ski-running is one of the sports to which women have been admitted without controversy. There may be differences of opinion as to whether women should jump, but their right to tour on ski has never been questioned. No doubt this is partly due to the intimate connection between ski-ing and mountaineering, the fact that the lady mountaineer should take to ski-ing being found quite in the order of things, the equipment and the requirements for both being very similar.

Her right to ski being thus unchallenged, there remains the question as to how far her sex handicaps a woman or modifies her success in ski-running.

All the arguments in favour of touring for men apply equally to women. As a healthful, invigorating sport, strengthening nerve and muscle, it is hard to beat. Nor is woman

physically at so great a disadvantage compared with man in this sport as in many others, for here pre-eminently it is knack and skill rather than muscular effort that eventually go to the making of a proficient ski-runner. It is notorious that light, slender, wiry individuals learn more easily than those of larger proportions and heavier build. But here it is necessary to utter a word of warning. Knack and skill are only acquired after the beginner has gone through much exhausting physical labour. The movements which the expert makes instinctively and without effort cost the beginner a good deal of muscular strain. A woman's eligibility for ski-running depends on her capacity for enduring this strain without injury to her health. Here it is almost impossible for the outsider to give advice. Many slight, delicate-looking women have more stamina than those of robuster appearance. It is a question for a woman's own common sense and experience to decide.

As a matter of fact, the disabilities under which a woman suffers in ski-ing arise not so much from her sex or her health as from certain differences which mark off her performance of the sport from that of men. It is venturing on dangerous ground nowadays to institute comparisons between the sexes. One would imagine from what one hears that civilisation has obliterated or is fast obliterating all distinctions

between men and women, yet nowhere so much as in the field of sport do these distinctions make themselves more felt. Some of these differences may be primary, and, as such, fundamental; many are undoubtedly secondary, tending to disappear with increase of knowledge and training.

A man, if he goes in for something new, will practise until he is tired and will then stop; a woman will often let her enthusiasm tempt her to try to do more than she is able. A man goes in for ski-ing as a rule more methodically than a woman. Her idea is to go on a tour as quickly as possible, and not infrequently she shirks the preliminary work in the practice field. The result is she returns from her first tour, which she usually makes with better runners than herself, tired out and discouraged. Instead of recognising her error, she consoles herself with the idea that she will be in better form next day, when she again starts gaily—with the same results. Now, though in a series of such tours a woman may pick up something of ski-craft, it will not be adequate, and it will be at the cost of physical stress and strain which might have been avoided. The very strong may pass through the ordeal unscathed; to the less robust it may mean the eventual abandonment of a sport which they might have mastered and enjoyed if they had begun it in the proper way.

Another difference between the average man and woman is exemplified in the way they regard the implements of their sport. Few women show the interest in their ski which men do. They are seldom curious as to their make and fit, trusting generally to outside advice on the subject. The same applies to outfit. A woman with no experience of ski-ing will start on a tour without the slightest preparation. She has a vague idea that if she wants something some man of the party is sure to have it. Rather than carry a rucksack she bunches her luncheon somewhere about her person, or relies on some self-denying friend to carry it for her. All the indispensable items of outfit which a man carries as a matter of course, such as an extra wrap, goggles, a knife, she disregards in a way which is truly feminine. The result is that on tour few women are properly equipped, and have as a rule to depend on men to perform such services for them as the scraping of the snow off their ski or the removal of their sealskins.

Now, though one particular man may be charmed to do these things for one particular woman, it is very certain that no man wants to do them for half a dozen at a time.

It is in the matter of dress and outfit generally that the difference between men and women comes out most strikingly. We need not discuss the question as to whether men or women

are the vainer. What is certain is that a man rarely—save perhaps in extreme youth—lets his vanity interfere with his comfort, whereas a woman will endure any amount of discomfort on account of hers. With a man, too, utility is the first consideration in providing his outfit for any particular sport; with a woman the first question is, "How shall I look in it?"

Now it is perfectly certain that if a woman goes in seriously for touring on ski she must consider the usefulness of her costume before anything. This brings us at once to the question as to whether knickerbockers or a skirt are the most practical garment for her to wear. Æsthetic considerations will probably incline most people to the skirt. We must remember, however, that if women spent the time and trouble over the cut and fit of their masculine attire which they devote to exclusively feminine garb, and our eye were to see them constantly in such garments, we might end by considering them the most becoming, so much are we the slaves of habit in these matters. When a woman has learnt to ski, and is simply disporting herself on the practice ground, there is no reason why she should not wear a short skirt if she prefers it, but for learning and touring every consideration of hygiene and convenience suggest the knickerbocker as the most practical garment. So much has already been written on the subject that it is

unnecessary to enlarge upon it here. Too often, however, a woman, hearing she should wear knickerbockers, goes off to the next best tailor or dressmaker and straightway orders herself a pair of bloomers—than which there is no more unbecoming nether garment in existence. With these and a coat cut too short it is small wonder if she gets no satisfaction out of her reflection in the glass, and, regarding knickerbockers with abhorrence, becomes the most conservative advocate of the skirt, supporting her thesis with the usual platitudes.

If one is going in seriously for ski-ing it is really worth while to get a good costume for the purpose. It will do for other sports besides—golfing, mountaineering, boating, and so forth—and, as it is independent of changes in fashion, will last several seasons. To be useful and at the same time becoming, it should consist of a coat, skirt, and knickerbockers, all of the same strong, smooth material to which snow will not stick. The coat should be double-breasted, loose, and not too short, for the secret of making a satisfactory masculine costume for a woman lies in concealing the lines of her figure. There should be pockets large enough to hold such items as a knife, goggles, string, handkerchief, &c. The knickerbockers should be most carefully cut. The tight riding-breeches so much affected by men are not becoming to a woman's

figure, tending to give her a knock-kneed appearance. Wherever there is actual tendency to knock knees, however slight, the knickers should be made to hang over a little at the knee. This can be done without giving them any semblance to bloomers. The skirt should be short and as light as possible, so that it can be carried in one's rucksack and donned and doffed where necessary. To make movement in it easy when it is worn over the knickerbockers the front breadth might be lined with silk. As to what is worn under the coat, individual taste must decide. Some ladies will prefer a sweater, some a flannel shirt. The point to remember is that the coat or some *wind-proof* garment (such as a jacket of impregnated silk) must accompany one on tour, and that no amount of extra sweaters can take its place.

As to headgear, there is a certain margin for individual taste. As long as there is provision for covering the ears in case of wind, storm, or intense cold, a lady may wear what she likes (hood, bashlik, Engadine cap, ordinary tweed cap). All elaborate hair dressing should be avoided. A simple coiffure on which the cap sits firmly will prevent a lady returning from a tour with that dishevelled appearance which may lead one to suppose that she has had more falls than is actually the case.

All that has been said about men's boots applies

as emphatically to those of ladies. It cannot be too strongly insisted upon that boots to be of any use in ski-ing must have low heels and be several sizes too large, so as to admit of one or two pairs of thick socks being worn over the stockings. Only thus can one be protected from the dangers of frost-bite on a high mountain tour. Here, again, ladies are great sinners, and very often slow progress in learning is due to the absence of boots strong and thick enough to give the necessary support to the foot. Nor must one grudge the money spent on boots. In this case, as in many others, the dearest thing turns out cheapest in the end. Any one who has experienced the difference between touring in waterproof boots and in such as let in the snow, will not hesitate as to the desirability of the former ; but this luxury has its price like any other.

As to other items of personal outfit, it is obvious that what is necessary for a man on tour is equally so for a woman. I need only, therefore, recommend a careful study of the chapter on outfit. Where a party is mixed, the ladies will only be expected to take their own personal outfit and provisions, the men not expecting them to carry articles wanted by the party in common.

One of the charms of ski-ing is the social intercourse it promotes between men and women, an intercourse far less restrained and more comrade-

like than that of the drawing-room. I am therefore no advocate of ski tours composed entirely of women. On the other hand, tours consisting of women only, and led by them, would have the advantage of training women in these habits of independence and observation which they have little chance of acquiring so long as they tour with men. Certain adventurous ladies north of the Tweed have already formed their own mountaineering club, and organise and carry out mountain climbs quite independently of their men-folk. There is not the slightest reason why, under certain conditions, ladies should not tour alone on ski. It must always be remembered, however, that if a woman undertakes to do what a man does, she must have the same qualifications for the task that he has. First-class ski tourists have generally a mountaineering experience behind them to which few women can lay claim. That such an experience is absolutely necessary for more ambitious ski-running this book has been written to prove. For the present, therefore, it will only be under certain limited conditions that women will be able to aspire to the highest honours of the craft.

A word as to the etiquette of ski-ing. Every sport has its etiquette, and that of ski-running is no less important than that of golf.

Where ladies often show want of consideration is in joining a tour for which they are not able.

Now one may do this once, but there is no excuse for doing it a second time. I do not wish to imply that men do not sin in this respect, but here I am writing for ladies. One has only to be on a tour where one of the party is much weaker than the rest to understand the inconvenience it causes—the frequent stoppages, the endless waiting, the necessity some of the party are under of remaining behind to see that nothing happens. If a woman knows that she cannot keep up with the others she should have the good sense and good feeling not to join them until she has made more progress. On the other hand, there is a give-and-take here as elsewhere, and it ill becomes good ski-runners to stand aloof and avoid having anything to do with beginners.

In conclusion, I may say that when women take seriously to ski-ing, they are able to hold their own with men on all average tours, while in the case of extra physical strain or exposure a woman's power of endurance and abstemiousness are for her as excellent weapons of defence as a man's greater vigour and muscular power are for him.

A woman may lack the originality to find out the best road for herself, but when it is pointed out to her, she has generally sense enough to see it and to follow it with success. It has been so with other sports, so let it be with ski-running.

H. Hock.

MORNING.

To face p. 158.

Dr. Clark.

A Track.

F. A. M. Noelting.

On the Heights.

To face p. 159.

LITERATURE

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E. Russell Clarke, "Mountaineering on Ski," Alpine Journal, August, 1909.

Avalanches.

See the various books on Ski-ing and Mountaineering, and also:—
Alpine Journal, February, 1907, "On Snow Avalanches." By Henry Hoek.
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CLUBS.

Ski Club of Great Britain.—Hon. Sec., E. R. Darnley, Colonial Office, S.W.

The Alpine Ski Club.—Hon. Sec., Arnold Lunn, Balliol College, Oxford.

Only ski-runners with a good touring qualification are eligible for this club.

Scottish Ski Club.—Hon. Sec., T. S. Muir, 10, Glengyle Terrace, Edinburgh.

Public Schools Alpine Sports Club.—Hon. Sec., Watkin Watkins, 33, Evelyn Gardens, S.W.

The objects of the club are to give information about winter resorts and to make arrangements.

Visitors' Ski Club Kitzbühel.—Hon. Sec., W. R. Rickmers, Kitzbühel, Tyrol.

The objects of this club are to give instruction to beginners, and to bring them up to touring standard in the shortest possible time.

APPENDIX

CRAMMER'S LIST

General.

Are bindings and outfit in order?
Try to understand each position.
Practise slowly with a little methodical exaggeration.
Study first in a still position.
Wherever possible practise a position first on the spot, then moving on; on the level, then on a gentle slope, then on a steeper one; across a slope, then straight down.
First take separate positions, then combine.
Change about right and left; do not become one-sided.
Use a stick sometimes, sometimes not.
Change your ground frequently.

What is Wrong?

If unsuccessful ask yourself:—
Is the position correct (ski, body, stick)?
Are the ski too short or too long?
Does the binding fit properly?
Is the snow sticky? are the ski too slippery?

Is the slope or the snow favourable to this particular movement?—that is to say, is the exercise in question possible or necessary under these conditions?

Am I tired or handicapped by high-heeled boots, long skirt, &c?

Mistakes and Unfavourable Conditions.

Always.

Stiff and cramped position of the body; hanging on to the stick; hurry; crusted or irregular snow.

First Position and Walking.

Ski not parallel; no lunge; stooping; lifting ski from the ground unnecessarily; going uphill too steeply; sticky snow.

Kick-turn.

Ski too long: binding wobbly; ski not parallel or too far apart; knees bent; stick on the wrong side; standing badly on the slope.

Darting.

Ski too short; ski not locked; stooping or leaning back; clinging to the pole; holding stick in front; ground too steep or difficult to overlook.

Stemming.

Ski excessively long; not forming an angle with the ski (points apart, ends approached); braker points downhill; edging too much; not going forward on the glider; leaning back; stick long; ground not steep enough; snow too deep.

Curving.

"Heels" (*i.e.*, ski-tails) not sufficiently apart; edging; stick long; stooping and leaning back; no swing; too fast (hurried) or not fast enough (no impetus, snow sticky or deep, slope too gentle).

Swings.

Ski too short; faults in the "knack" or the edge; unsuitable snow.

Jumping.

Ski too short; improper binding; insufficient sats; ski not level and parallel; bad shape of hill; soft or sticky snow.

Right or Left.

(r. or l.) means the side of the advanced ski (foot, leg) or the side of the slope and stick. In the kick-turn it is the side which begins; in stemming, the side of the braker; in swings, the side to which one turns, the inside of the circle.

SUGGESTIONS FOR PRACTICE

First Day.

Have you all your things? (See list.)
Strap on and take off ski (twice).
Lie down and get up (6 times).
FP, on ball, on heel (3 times).
FP—WP—WL—FP (20 times).
Walk on level, 5 minutes with stick, 5 minutes without.
Turn round 3 times (§ 7).
Kick-turn on level (20 times).
Kick-turn on a slope (10 times).
Study DS—DG—DB on the level; also changes DS—DG—DB.
Climb a gentle slope in 4 tacks; run down DS (3 times).
Climb a gentle slope; run down DG (3 times).
Guide by slightly leaning sideways every third time.
Steer and stop (3 r., 3 l.) as in §§ 15, 16.
Run down DB (3 times).
Climb and dart without carrying a stick at all (3 times).
Walk on the level (5 minutes).
Slowly climb a hill with varying slopes, steep and gentle, for about 20 minutes or half an hour.
Tack down slanting, one tack DS, next tack DG, and so on.
Dart on short, gentle slope, with the following changes during the run :—
DSr—DGr—(FP)—DSl—DGl (3 times).
DSr—DGr—DBr—DBl—DGl—DSl (3 times).
DGr—DBr—DBl—DGr quickly (3 times).

Work back home by a roundabout way over broken or undulating ground (about 15 minutes).

Second Day.

Reach a new practice field across broken ground with short climbs and descents, paths and ditches. Apply various hints on climbing uphill (§§ 6, 10, and "Tackling"), such as lunging, stamping, lifting the tail.

Ten minutes' vigorous and steady walking on the level, straight, narrow spoor.

Smart kick-turn on a slope without a stick (5 times).

Make the experiment as in § 18 (5 times).

Snow-plough (§ 19) on a short, gentle, beaten slope (3 times).

Study DT and crouching on the level and on a short slope.

Dart down a long, gentle slope, practising changes, first slowly then smartly.

DBr—DGr—DTr—DBr—DBl—DTl (3 times).

DBr—crouch—DBl—crouch (3 times).

DTr—DTl—DTr—DTl (3 times).

DBr—crouch—DBl—DTl—DBl—crouch—DTr (3 times).

DGr—DTr—DTl—DGl (3 times).

Climb slowly three quarters of an hour and come down as best you can, slanting on the steeper slopes, darting on the gentler ones.

Study the stemming positions SG and SS on the side of a steep hill, on the spot, thus: FP—DB—DG—SG—SS—DB—FP (5 r., 5 l.).

Slant DB a few yards, then DG—SG; continue SG for a few yards, then SS, and so on, 10 times over a distance of 100 yards (5 r., 5 l.), always stemming a short way, then stopping SS.

Keep up SG over the entire distance, that is to say run a long way in the stemming position (5 r., 5 l.); at the end SS, finishing up DB—FP, smartly.

Slant—SG—slant—SG (twice).

Climb slowly for 1 hour up a more complicated hillside with various slopes, trees, gullies, &c., and run down stemming and darting according to the nature of each section of the ground.

Third Day.

Carry a rucksack with 4 lbs.

Climb 1½ hours; select steep ground, and descend mainly by stemming.

Repeat the darting exercises of the second day on slopes of varying steepness (see "Tackling").

Climb 1 hour as quickly as you can without getting out of breath; descend quickly but safely, putting in much darting over the gentler stretches.

Fourth Day.

Rucksack with 6 lbs.

Practise curving on moderate slopes, many times right and left.

Begin by standing in SS (with stick already changed over), then SG and curve by putting weight well outside, standing upright and forward, keeping the ski flat and forcing the tails apart.

Then running—

Slant DB—DG—SG—curve—SS—FP—DB—DG—SG—curve—SS—FP; next: Slant fast, slow down by SG—curve—SG—slant; then: Curve—curve; finally: Curve—DB (stick swing, § 34).

Half-day excursion. Climb steadily for 2 hours. Come down comfortably, avoiding falls.

Fifth Day.

Full day excursion to the top of an easy mountain, say 2,500–3,000 ft. above the starting place.

It must be understood that these five days are "full practice" days marking the stages of progress towards the first long excursion. This means that the learner may proceed to the next when able to perform in one day the task allotted to it. Only the very strong and agile can hope to crowd this practice successfully into five "calendar" days. These five practice days may last anything from one to three weeks, being lengthened by fatigue, stiffness, days of rest, bad weather, &c.

LISTS OF OUTFIT*

Beginners.

Ski with bindings.
Stick.
Boots.
Gloves (stock 3 pairs).
Socks (sundry).
Puttees.
Cap (with ear-flap, or a comforter).
Snow-goggles.
Ointment.
Spare straps (1 toe, 1 heel).
Key to binding (where necessary).
Knife.
Rucksack.

On Tour.

Food.
Drink.
Tins or bags for food.
Bottle.
Waistcoat, sweater, or jersey.
Wind-jacket.
Foot-covers or sacks.
Glacier hat.

* For the beginner I give what is *necessary*. The rest of the list includes articles necessary, possible, or desirable, according to the requirements of the case or to individual taste and experience.

Sealskins.
Spare tip (emergency tip).
Repairing tools.
Screws, nails, wire, tin.
Brandy as medicine.
Bandage and plaster.
String.
Newspaper.
Matches.
Compass.
Map.
Glacier salve.
Sardine key or opener.
Notebook.
Pencil.
Money.
Camera and plates; yellow screen.
Watch.
Safety pins.
Ski-wax.
Old kid glove.
Pipe.
Tobacco.
Handkerchiefs.
Whistle.

Very Long Expeditions and (or) Large Parties.

Spare socks and underwear.
Lantern.
Candles.
Rope.
Avalanche drags.
Shovel.
Cooking apparatus.
Spirit lamp.
Spirit.

Surgical (bandages, vaseline, needles, silk, lotions).
Medical (pills, astringent, tonic, aspirin, cocaine).
Emergency ski (only 3 ft. long, very broad).
Emergency bindings or spare parts.
Pistol, magnesium wire, fireworks (for signalling).
Field-glasses (telescope).
Ice-axe.
Crampons.
Needle, thread, buttons.
Bootlace.
Spare goggles.
Fire-wood, if not at hut (inquire).
Motor hoot.
Boot grease.
Soap.
Comb.
Tooth-brush.
Tiny mirror.

In the Ski-room.

Hammer.
Tweezers.
Nippers.
Gimlets.
Saw.
File.
Nails.
Screws.
Wire.
String.
Steel shavings.
Flat-iron.
Brushes.
Rags.
Petroleum.
Oils.

Paraffin.
Marking flags.
Confetti (for paper chase).
Spade.
Rake.
Spirit-lamp.
Spirit.
Shellac.
Sandpaper.

Possible Foods.

Bread or biscuits.
Butter, cheese, bacon.
Cold tongue, ham, chicken, eggs.
Sardines, *pâté de foie gras.*
Fresh fruit.
Figs, prunes, dates, raisins.
Jams, marmalade, honey.
Cakes, plum-pudding.
Sugar, chocolate, acid drops.
Desiccated peasoup.
Lemons, salt, pepper.
Drinks: water, tea, coffee, lemonade.

TOURING MEMORANDA

Start early.
Has nothing been forgotten ?
Count the members of the party.
Go slowly ; regular pace.
Do not break your ski.
Keep together ; do not make misleading tracks.
Lunch before getting into the wind ; eat not too late.
Get things done (eating, repairs, &c.), while the sun shines or while there is an easy opportunity.
Always keep your eyes open and think.
Always expect danger, change of weather, nightfall.
Look out for avalanche conditions on your slope, but also above and below.
Look out for cornices, they can be extremely wide.
The snow over streams is often hollow.
Put on the rope as soon as possible and keep on as long as possible.
On the glacier expect a pull at any moment.
When in difficulties : think, do not hurry, do not allow relaxation among the members of the team.
When lost, mark the spot and reason out : when did we leave the proper route and did we turn right or left ? which is the right general direction ?—do not go in a circle, but keep straight by looking back on track.
Ask for help when in need ; say when you are ill, tired, or threatened with frost-bite.
When slipping, stick to hip !
Take off ski when not feeling safe.
Turn back before it is too late.

INTERNATIONAL SIGNAL OF DISTRESS

Anything that has a chance of being seen or heard will serve as a signal to attract attention. The Alpine signal of distress consists of *regular repetitions within a minute.* These repetitions make a set, and between each set there is an interval of 1 minute.

The CALL *for help.*—Show something or shout *six* times during a minute. Make a pause of 1 minute and repeat again.

The ANSWER *to a Signal of Distress.*—Signal *three* times a minute. Then pause of 1 minute.

Shout, whistle, or shoot; wave a coat (tied to a stick), a plank, or a ski; catch the sun in a looking-glass; alternately show and cover a light or fire. In short, do something which is visible or audible. Let this be seen or heard for, say, 2 seconds; then wait 10 seconds (count from 1 to 20 at the usual rate of counting), and so on, until the signal has been given six times. Then wait a minute (count 1 to 120). In the answer the intervals between the three short signals would be roughly 30 seconds (count 1 to 60).

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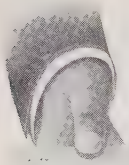

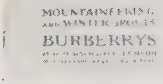

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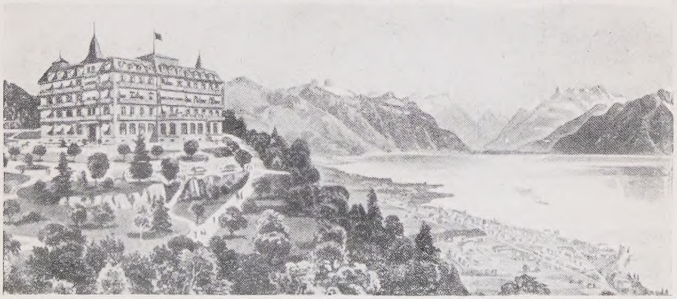

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